Center for Integrative Studies in General Sciences
Michigan State University
Faculty Onboarding

CISGS - Mission

To make a real-world difference in the lives of MSU students and future generations, by fostering ***Scientific Literacy*** among our undergraduate students and educators of tomorrow.

Vision

CISGS will provide the highest quality inclusive instruction, fostering *Scientific Literacy*, increasing our students' curiosity for the natural world, enhancing their capacities for critical thinking and evidence-based argumentation, and instill in them a recognition of the value and importance of science in society. CISGS will leverage collaborative partnerships across campus to ensure the delivery of an innovative and cohesive curriculum providing knowledge and transferable skills that benefit students in their majors, their careers, and their lives beyond MSU.

Values

- ***Community***

Success and excellence are far more attainable when people recognize that they are valued members of a safe and supportive community. This is true for students, faculty, and staff. We are committed to supporting the academic, professional, and personal needs of every member of our community.

- ***Leadership***

In the face of an ever-evolving institutional landscape, proactive innovations are essential in support of our learning community. We are committed to providing campus-wide leadership to enhance the undergraduate experience and general education.

- ***Collaboration***

We believe that the delivery of a world-class undergraduate education is enhanced by and requires deliberate and thoughtful collaborative partnerships with diverse stakeholders across the institution. Collaborative partnerships enhance faculty and student success.

- ***Diversity***

We are committed to actively supporting a diverse learning community, for both our students and our teaching faculty. We seek to create welcoming and inclusive learning environments that respect and affirms diverse backgrounds, experiences, and rich perspectives.

CISGS Goals

MSU Students will . . .

- Describe and communicate scientific principles and ideas in the biological and physical sciences, and explain the origins of major scientific achievements and theories.
- Discriminate between ideas that do and do not constitute subjects of scientific investigation, give examples of how scientific understanding constantly evolves, and apply scientific approaches to solving problems and reflect about the natural world.
- Practice critical thinking to evaluate the credibility of information that is presented as being scientific.
- Practice scientific thinking and evidence-based decision making, applying these skills to societally significant questions and challenges.
- Value the efforts of biological and physical scientists as they continue to address practical needs and continue research into matters of fundamental and lasting importance.

To achieve the Mission and Goals, center faculty should produce assessments and teaching materials and interventions that align with the following competencies, which are aligned with the *MSU Undergraduate Learning Goals*. [1]

ID	Domain	Competency	Example objective
	Scientific Literacy [2]		
SL1		Students understand, experiment, and reason as well as interpret scientific facts and their meaning to answer questions derived from curiosity about everyday experiences.	Students will be able to explain the greenhouse effect and be able to predict future trends in climate.
SL2		Students describe, explain, and predict natural phenomena.	Students will be able to discuss the process and impacts of increased fertilizer inputs to waterways.
SL3		Students identify scientific issues underlying national and local decisions, express positions, and make decisions that are scientifically and technologically informed.	Students will be able to describe how reduced insect populations might affect their future careers or lifestyles, and to make decisions that might reduce impacts on insects.

	Information Literacy [3]		
IL1		Students search for information as a means of idea creation and exploration.	Students will evaluate if retrieved information satisfied need and will refine search if necessary.
IL2		Students weigh the use of information according to the constructed and contextual authority that created that information.	When shown multiple sources, students distinguish between scholarly and popular sources in order to select appropriate sources for academic research.
IL3		Students treat information as if it has value.	In a writing assignment, information is properly cited for an evidence-based argument.
	Quantitative Literacy [4]		
QL1		Students communicate with and learn from graphs, figures, and models.	Given a novel graph/figure, students are able to interpret a point, trend, and the overall message.
QL2		Students collect and transform data to make and interpret summary statistics and scientific calculations.	Given a scenario, students can collect the data, run summary statistics and interpret the patterns.
	Diversity		
D1		Students interpret scientific findings and implications from multiple perspectives.	Given a new scientific development or technology, students will be able to describe differences in impact to various stakeholders.
D2		Students see themselves as potential producers and consumers of science.	Student seeks out information from scientific sources when they have a scientific question.

(1) MSU Undergraduate Learning Goals. https://learninggoals.undergrad.msu.edu/about

(2) Aligned with National Academies of Sciences, *Science Literacy: Concepts, Contexts, and Consequences* report (2016). http://www.nap.edu/23595

(3) Aligned with the Association of College & Research Libraries, *Framework for Information Literacy.* http://www.ala.org/acrl/sites/ala.org.acrl/files/content/issues/infolit/framework1.pdf

(4) Aligned with the Association of American Colleges and Universities, *Quantitative Literacy VALUE Rubric.* https://www.aacu.org/sites/default/files/files/VALUE/QuantitativeLiteracy.pdf

CISGS Curricular Structure, Scaffolding, and Assessment

While every CISGS course is expected to be a rich blend of each of the Scientific Literacy domains and competencies described above, the CISGS curricula is intended to be a scaffolded sequence of courses. To clearly differentiate between an ISB, an ISP, or a Lab course, a portion of each course is anticipated to place greater emphasis on specific sub-competencies. As a rule

of thumb, it is anticipated that faculty have the latitude with roughly 80% of their course to engage students in the scientific discipline(s) they are most passionate about, while devoting roughly 20% of any course to help students meet the specific CISGS sub-competencies as is mapped out below. Faculty support will be provided to design and implement interventions and assessment that place a specific emphasis on CISGS sub-competencies as described below.

ISB Courses

Information Literacy

Students will . . .

- Cite a source correctly and describe the need for doing so.
- Use research tools and indicators of authority to determine the credibility of sources, understanding the elements that might temper the credibility.
- Recognize that authoritative content may be packaged formally or informally and may include sources of all media types.
- Define different types of authority, such as subject expertise (e.g. scholarship), societal position (e.g. public office or title), or special experience (e.g. participating in a historic event)
- Recognize issues of access or lack of access to information sources
- Identify why some groups/individuals may be underrepresented or systematically marginalized within the systems that produce and disseminate information.
- Evaluate a source using specific criteria to determine whether a source meets their information need.

Diversity [5]

Students will . . .

- See themselves as scientists through investigations of diverse people from diverse backgrounds that have made essential contributions to the body of scientific knowledge that exists.
- Cultivate a growth mentality for learning about the diversity of communities and identities; histories and current examples of social and environmental injustices; and various ways of working for inclusiveness and equity.
- Identify specific ways by which human health and / or environmental challenges that society faces can disproportionately affect certain populations due to socio-economic contributing factors.
- Reflect on and critically examine how life experiences and communities shape their knowledge, beliefs, values, and biases.
- Identify specific strategies/interventions/actions for working toward social and environmental justice and equity in everyday life and/or in their own communities or career fields.

(5) ISB courses are among those available at MSU that allow students to complete aspects of the University Diversity Requirement (I,D,N), with every ISB course carrying the D designator.

Laboratory Courses

Scientific Literacy

Students will . . .

- Propose a way of exploring a given question scientifically
- Recall and apply appropriate scientific knowledge
- Design and conduct an investigation to explore a science question of personal or societal importance
- Offer explanatory hypotheses
- Evaluate ways of exploring a given question scientifically (application)

Quantitative Literacy

Students will . . .

- Given a novel graph/figure, interpret a point, trend, and overall message.
- Given novel data can make a graph/figure to discover and communicate an important aspect of the data.
- Reconcile the assumptions of a graph or figure with its interpretation, communication and application.
- Given a visual, critique the graph/figure for its appropriateness and alignment with graph/figure's purpose.
- Analyze and interpret data and draw appropriate conclusions.
- Collect and transform data from one representation to another.

ISP Courses

Scientific Literacy

Students will . . .

- Recall and apply appropriate scientific knowledge.
- Make science-based decisions about personal choices.
- Distinguish questions that are possible to investigate scientifically.
- Explain the potential implications of scientific knowledge for society.
- Identify scientific concepts and processes involved in a scientific issue.
- Explain why and how scientific information is subject to revision.
- Recognizes and applies scientific claims, evidence, and reasoning to construct a valid argument.
- Make and justify appropriate predictions.

Quantitative Literacy

Students will . . .

- Describe and evaluate a range of ways that scientists use to ensure the reliability of data and the objectivity and generalizability of explanation.
- Evaluate ways of limiting bias and the range of assumptions that would be acceptable for their question.
- Develop and use models to communicate scientific knowledge and to make predictions.
- Connects claims, evidence, and reasoning to make an argument for a course of action.