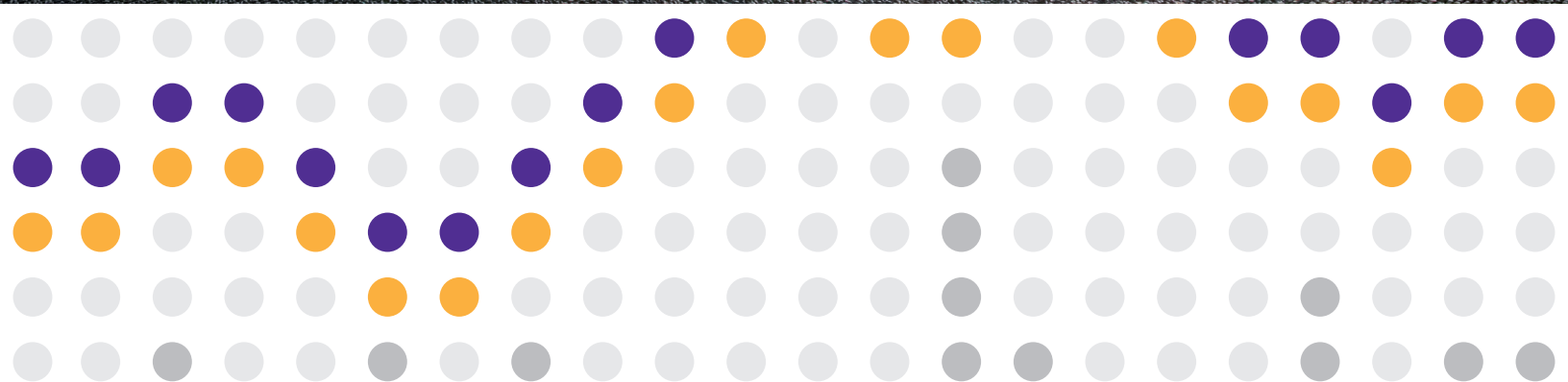
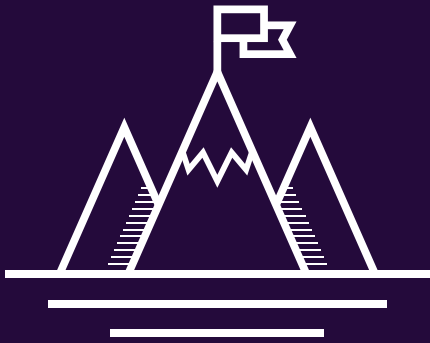


Catching FIRE

THE OFFICIAL NEWSLETTER OF THE NYU TANDON DEPARTMENT OF FINANCE AND RISK ENGINEERING





Mission Statement Takes on a Redefined Meaning for the FRE Department

The FRE Department recently implemented a new Departmental Mission Statement identifying the overall goals of their operation:

FRE strives to be recognized globally as the premier academic program in financial engineering, redefining the profession, providing research and thought leadership, and building a strong professional network of alumni and affiliates.



Faculty Grants Recently Awarded: Machine Learning Research Initiatives

Machine learning (ML) methods have recently gained considerable attention as a set of tools that are very effective for solving large-scale optimization problems in artificial intelligence and data science. The neural network architecture that is present in many of these methods has some universal approximation properties that allow users to apply software tools with minimal upfront preprocessing of data or tailoring of algorithms to the specifications of the problem. However, in most instances where ML works well, mathematical analysis does not yet offer a satisfactory answer to the fundamental question: Why is a machine learning method so effective for solving this problem? The aim of this project is to investigate how ML methods can

be applied toward solving non-Markov dynamic programs (DPs), and to answer this fundamental question for some specific problems in this area.

To advance the research frontiers in ML at NYU Tandon, this past May, a University Research Challenge Fund (URFC) grant, from the Office of the Provost was awarded to Professors Andrew Papanicolaou and Agnes Tourin for their collaborative research initiative, "Machine Learning for Non-Markov Decision Problems." In addition, in August 2019, the National Science Foundation (NSF) granted Papanicolaou an award from the DMS program in Applied Mathematics for his research project "Deep Neural Networks for Solving Non-Markov Optimization Problems."

FRE Dads: Keeping it in the Family

This past fall, Peter Carr, FRE department chair and Barry Blecherman, FRE deputy chair, shared a special bond as they welcomed their children to the NYU Tandon community. Olivia Carr, Peter's daughter, joined the Computer Science Department undergraduate program. She is interested in pursuing a career in programming, but Olivia's major interest is her two kittens, Mic and Mac. Barry Blecherman's son, Joshua, also entered the CS undergraduate program, where

he will major in computer science or computer engineering. Josh follows in the footsteps of his grandfather Sid, who graduated in 1956 from the Polytechnic Institute of Brooklyn (our former school name) with an undergraduate degree in chemical engineering. Please join us in welcoming Olivia and Josh to NYU Tandon as they embark on new educational journeys, while creating their own academic footprints.



Rising in All Ranks



The 2019 QuantNet ranking was based upon several achievements: 87 percent of NYU Tandon's financial engineering graduates who were seeking employment found positions within three months of graduation, and starting salaries averaged \$91,000. The rankings also noted our department's customized educational environment, with small class sizes (averaging 15, and none larger than 30) and more than 50 course offerings. The program ranked ninth in the country, tied with the Massachusetts Institute of Technology Master of Finance. (NYU's Mathematics in Finance program at the Courant Institute of Mathematical Sciences was also included among the leaders.)

The program was also recently recognized as one of the best in the nation by the online news platform TFE Times, which listed it at number four - up three places from the previous year. TFE Times rankings are based on mean GRE scores, mean starting salary and bonus, mean undergraduate GPA, acceptance rate, full-time graduates employed at graduation and three months after graduation, total number of distinct courses available, and total research expenditures, all areas in which the department enjoys strong statistics.

50,000
Coursera students

The FRE Department launched a specialization on Coursera titled Machine Learning for Finance, which has had more than 50,000 students enrolled in the program during the past year.

169.2
Average Quant
GRE score

The average Quant GRE score of admitted applicants is up from last year's 169.1.

1,786
Applicants

450 students admitted and 157 enrolled

157.5
Average Verbal
GRE score

The average Verbal GRE score of admitted applicants is up from last year's 155.

157
New student
enrollment

New student enrollment is up from last year's 115.

3.85
Average
undergraduate
GPA

The average undergraduate GPA of admitted students who attended U.S. universities (that's 160 of the 481 admissions) is up from last year's 3.75.

FRE's Newest Faculty

The Department of Finance and Risk Engineering continues to grow and diversify with a new crop of instructors.



Jon Hill

Jon Hill's area of expertise is the relatively new field of quantitative model governance. "While model validation addresses the risks *within* quantitative models, model governance addresses risks within a firm's extended model ecosystem that are *outside and between* models, such as model interdependence," he explains.

He is fond of a quote from a British statistician named George Box, who famously said, "All models are wrong; the practical question is how wrong they have to be to not be useful." There can come a point, however, as Hill points out, at which a model is so wrong that it ceases to be useful at all; model validation and governance address that issue, with the validation process examining the standalone model and determining if it is fit for purpose, while model governance is responsible for the holistic fitness of a firm's entire model ecosystem, which can include several thousand models at leading financial firms.

Over the course of his long career, Hill has performed hands-on model validations at Solomon Smith-Barney (which later became Citigroup); headed the Risk Model Validation Group (RMVG) at Morgan Stanley, where he was charged with creating and training a new ground-up model validation quant team; and served as Global Head of Model Risk Governance at Credit Suisse where his team had responsibility for the ongoing identification, measurement, risk rating, inventory and monitoring of corporate model risk across all of the company's business units, regions and legal entities.

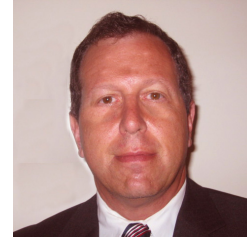
Finance professionals who perform model validation and governance roles are members of a technical specialty class known as "quants" in the industry. "This is still a fairly small world," Hill says. "You've heard of 'six degrees of separation,' but in the financial quant world it's more apt to be 'three degrees of separation.'"

Hill, who regularly publishes in such outlets as the *Journal of Structured Finance*¹ and *Journal of Risk Management in Financial Institutions*², just may be among one of the most recognized figures in the growing world of model risk governance: he is frequently called upon to chair conferences, give keynote presentations, and organize workshops around the globe, and he currently heads the New York Chapter of the Model Risk Mangers International Association (MRMIA), whose purpose is to promote awareness of model risk to the broader risk and financial communities and to provide a forum for discussion of the challenges and regulatory requirements in the field.

Model risk governance could offer a compelling career path for Tandon's FRE students. Given how rare it is to encounter someone with experience in the field, Hill predicts that once they have completed his course, Model Risk Management and Governance, grads may, in all likelihood, be going into job interviews knowing more about the topic than even those who will be interviewing them.

1) Hill, J. R. (2018) "Shouldn't A Model 'Know' Its Own ID?"; *The Journal of Structured Finance*, Fall, pp. 89-98

2) Hill, J. R. (2019) "The 14 Top Challenges for Today's Model Risk Managers: Has the Time Come to Think About Going Beyond SR11-7?"; *The Journal Of Risk Management In Financial Institutions*, Spring, Vol. 12, 2, pp. 145-167



Ken Winston

Ken Winston had no trouble at all deciding what he would cover in his Topics in Risk Management course at Tandon. "I'm teaching what I'd want anyone I hired to know," he says. "With that knowledge mastered, they'll be interesting candidates for any hiring manager in the field."

Winston knows whereof he speaks: he has deep experience in a variety of industry positions and has hired numerous master and doctoral graduates. Among the posts on his CV are chief risk officer at Morgan Stanley Investment Management in New York and Western Asset Management in California. He recently retired from Western Asset Management and returned to New York.

"Retired," however, is far from an accurate word to describe Winston. "I left industry because I wanted to immerse myself in academia," he explains. "There are many papers I want to research and write." The idea of teaching is not a new one for him – when he was based with Morgan Stanley in New York, he taught at Courant, and he has long been an economics lecturer at Caltech – so when he was ready to focus on this new phase in life, he reached out to FRE chair Peter Carr, who was happy to have the longtime industry professional on faculty.

Since 1998 Winston has held a leadership role in the Society for Quantitative Analysts, a group dedicated to supporting innovation in the field. "The monthly meetings involve a lecture on a topic of interest," he says. "Students are welcome to join for a reduced fee, so I encourage them to take advantage of that."



Ernest Bayer

Ernest Bayer jokes that after he earned a Ph.D. in theoretical physics from the Weizmann Institute of Science and was first hired by Bloomberg as a quant, he barely knew what a portfolio was. His initial assignment involved a paper by none other than FRE chair Peter Carr, lending a nice symmetry to a career path that recently brought him to Tandon to teach a practical introduction to quantitative trading.

That path includes stops at SAC Capital, the Clinton Group, Credit Suisse, Hutchin Hill Capital, and Weld Capital Management – a firm where he currently serves as a senior quantitative researcher and which is known for its use of non-conventional data sets and interdisciplinary alpha harvesting.

His goal in the classroom, he says, is to encourage lively discussion, present the material in engaging ways, and provide the support students need to succeed. “We aren’t going to dwell too much on the theoretical,” he asserts. “This will be a solid, practical overview that will serve them well in the future and that I think they’ll enjoy.”

Although this will be Bayer’s first experience teaching at NYU, he is no stranger to the school. In 2011 he studied screenwriting over on Washington Square. “I do have a work in progress, and as you might expect, it takes place on Wall Street,” he says. “It’s a dark but comedic coming-of-age story about a young trader, and I should warn you if you ever read it, it has its share of profanities and violence.”

With a life that has taken him to Russia, France, Israel, and England, among other locales, and a career that has seen him go from total novice to university instructor, it’s hard to believe that any fictional screenplay could be more interesting than real life.



Ali Nazari

Ali Nazari had always loved math, but during his early years in his native Iran, that discipline did not seem to him like the pathway to a stable job. He turned his sights instead to electrical engineering – an area, he reasoned, that still heavily involved mathematical skill while presenting better job prospects.

Once settled in the U.S. and studying for his graduate degrees at the University of Michigan, Nazari chose a challenging multidisciplinary path that allowed him to merge all of his interests, earning master’s degrees in electrical engineering, financial engineering, and mathematics and focusing his doctoral work on network information theory and digital communications.

He found some personal motivation in the financial crisis of 2008. “Of course, I was saddened that people were taking losses, but it was also exciting to see what could be learned from the situation,” he said. “And as a struggling grad student who actually had very little to lose, it presented opportunities. I bought my first stocks around then – I can still remember when I purchased Ford for \$2.80 a share and was able to sell it within a year for \$11.”

Nazari’s professional life has been no less challenging and multidisciplinary than his time as a student: after a stint at JPMIS, a newly created intelligent-solutions group at J.P. Morgan where he developed the company’s first big data approach to collateral management optimization, he set out to help found a new-generation asset management firm. He and his co-founders were intent on riding the wave of explosive growth in data relevant to pricing assets combined with enormous advances in machine learning.

Their company, Data Capital Management (DCM), where Nazari serves as chief investment officer and portfolio manager, is, in essence, an event-driven hedge fund, able to apply AI and machine-learning tools to the massive amounts of heterogeneous real-time data now being generated in order to make informed investment decisions.

Despite the demands that such a venture involves, Nazari, whose many honors include an IEEE Information Theory Society Best Student Paper Award, given to him in South Korea in 2009, loves academia and wants to stay active in that milieu as well. “I was thrilled to be invited to teach a course in AI and machine learning to Tandon’s FRE students,” he says. “The program is graduating a lot of talented fintech people, and there may be internship opportunities for them with DCM.”

His students, he hopes, will take a page from his playbook. “I’m a very competitive, driven person, with a lot of energy,” he says. “I think you have to be to get things done.”



Tailored to Fit

Summer Boot Camp prepares FE cohort for coursework and summer internship interviews

The summer boot camp experience is tailored to fit the graduate students joining the Finance and Risk Engineering (FRE) Department at NYU Tandon, who join not only one of the most competitive quant programs in the world, but also one of the most competitive industries. A unique Pre-Graduate Program Boot Camp aims to make Tandon's newest students far more than competitive as they begin their studies in the city's iconic financial capital. The intensive course of study is particularly valuable since Master's students arrive at FRE with a wide variety of undergraduate backgrounds and must quickly develop a strong intellectual foundation in such areas as basic finance, linear algebra, probability and statistics, advanced calculus, and computer programming. The two-week in-person summer boot camp is unlike any offered by other engineering departments and aims to ensure that students can quickly meet their maximum academic potential at Tandon. The morning session includes

topics such as series summations and math inductions; probability and statistics; Markov chains; martingales and random walks; and stochastic calculus and options pricing. All of these topics are covered with an emphasis on solving problems that are typically asked in quant interviews. The afternoon boot camp session covers topics such as Python and NumPy; Pandas; introduction to Econometrics with Python; and introduction to Machine Learning with Python — all areas of expertise among the department's deep bench of faculty members. The in-person boot camp — overseen this year by Assistant Professor Andrew Papanicolaou and Visiting Professor Conall O'Sullivan — is mandatory for all incoming students, many of whom have also completed an optional six-week online boot camp in June and July taught by Industry Professor David Shimko.



During boot camp this year, Peter Carr surprised Barry Blecherman with an award to commemorate his 25th anniversary working as deputy chair in the FRE Department. The plaque read, "Thank you for 25 years of dedicated Service to Polytechnic University and NYU Tandon, with infinite gratitude and respect from your legions of grateful students, colleagues, and staff - 2019."

Recent FRE Grads Gain Acceptance into Doctoral Programs

The FRE Department is proud to announce that over a dozen 2018 and 2019 graduates enrolled in Ph.D. programs at NYU Courant, UC Santa Barbara, Tsinghua University, University of Texas at Austin, University of Massachusetts Amherst, Rutgers-Newark, University of Utah, CUNY, and Stevens Institute of Technology. We hope that the doctoral acceptances continue to rise as more students graduate from our program. A recent grad shared their future goals once they complete doctoral studies: “My proposed research areas include empirical asset pricing, market microstructure, and high-frequency finance. My future career goal is becoming an assistant professor in a research-focused business school upon graduation. In the long-run, after getting the tenured position, I aim to become a distinguished faculty member in finance.”



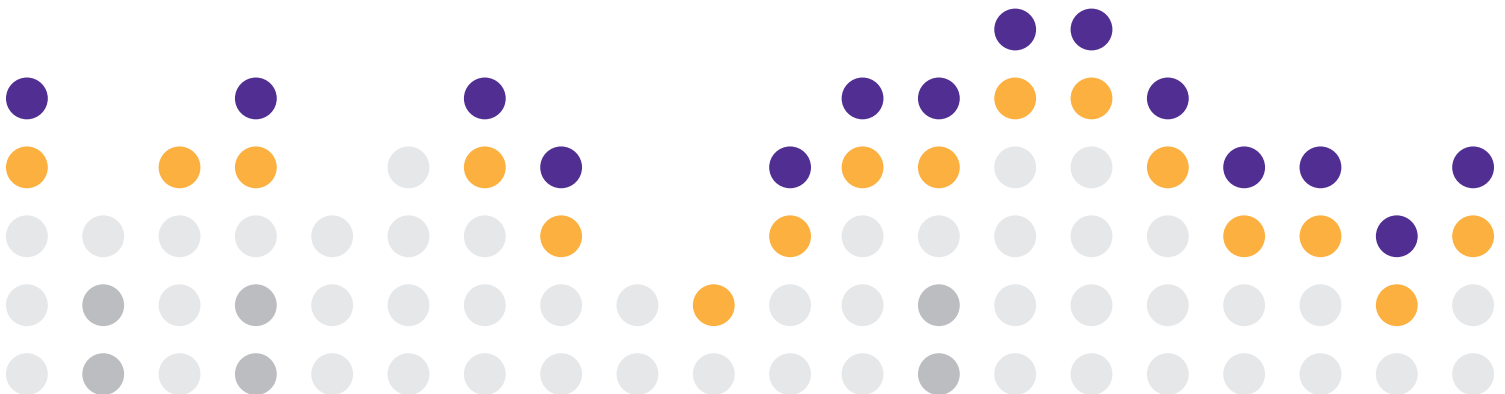
On the Job Front

FRE Alumni Job Spotlight Event

On Thursday, September 12th, Finance and Risk Engineering students packed the Pfizer Auditorium for the first-ever “Alumni Job Spotlight” event. Students were joined by four FRE alumni who enlightened them with 30-minute overviews of different aspects of the industry. Chao Lian of Nomura spoke about his global FRTB BA job function; Ryan Poirier of Salt Financial spoke about his position in Index and Product Research; Haojie Jing of Soros Financial gave a deep dive into life as a Quant Strat, and Ney Sheridan of Centiva shed light on the world of an Equity Volatility trader. Students had the opportunity to ask questions after each job spotlight talk, which helped them to better understand what it takes to succeed in these particular areas of industry. The FRE department looks forward to hosting additional job spotlight events in the coming months!



Chao Lian of Nomura, hosting his job spotlight talk for FRE students





Left to right: Panelists Yuxing Liang, Gaurav Shah, Shreya Gossain, Xiaowen Wang, Shreyank Gandhi; Moderator Sara DeLusant

Learning from the Best

FRE Recruiting Best Practices Panel

On Tuesday, September 10th, FRE hosted the latest installment of the FRE Recruiting Best Practices Advice Panel. This event – which is always a fan favorite – features successful second-year students who share their valuable recruitment advice with first-year students.

The September panel featured Shreya Gossain (interned with Barclays, Market Risk Division), Gaurav Shah (interned with American Express, Global Risk, Banking and Compliance group), Yuxing Liang (interned with Deutsche Bank, Global Markets Division), Xiaowen Wang (interned with Goldman Sachs, Investment Management Division), and Shreyank Gandhi (interned with KBW, Equity Research). Panel topics included advice on the best interview preparation books, how to balance school and recruiting, interview topics, and more!



Ashley Scott of IMC Trading hosting an FRE recruitment presentation

Firm Recruiting Presentations Aplenty!

FRE students have had the opportunity this fall to meet with representatives from many top firms who have come to campus to host exclusive FRE student recruitment presentations.

This fall, that list includes companies such as Morgan Stanley, Barclays, Credit Suisse, Goldman Sachs, RBC Capital Markets, and for the first time, IMC trading! These presentations are crucial to guiding students to the right opportunities and helping them to make valuable connections in advance of the many application deadlines throughout the fall.

Companies are invited to contact the Career Placement Director, Sara DeLusant (Set11@nyu.edu), with any career opportunities that you would like to share with our department.



The Bulls & Bears club in conversation with Prof. Jon Hill.

Bulls & Bears Under New Leadership

The Finance and Risk Engineering Club, “Bulls & Bears,” was implemented to spark community engagement and create a tighter knit cohort within NYU’s FRE program. The club strives to supplement the theoretical FRE coursework with the soft-skills and financial intuition necessary to thrive in the cutthroat world of finance. In the process, the club will enable students to enhance their personal and professional networks.

The club was originally founded in fall 2018 by recent graduates Alex Marchi, Claudio Gonzalez, Abhirit Kanti and Clio Wei. The new leadership consists of President Abhirit “Abi” Kanti, Vice-President Yashu “Dale” Zhu, and Managing Directors Christopher Rosin, Minghua “Henry” Xie, Congyu “Alexis” Xu, and Julia Kapran.



Prof. Nassim Taleb

Statistical Consequences of Fat Tails

Real World Preasymptotics, Epistemology, and Applications

Nassim Taleb, author of the New York Times bestseller *The Black Swan*, spoke at NYUTandon on October 24th to a crowd of roughly 100 people. Drawing from his *Incerto* essay series and many years of experience as a trader, Taleb commented on the assumptions underlying Gaussian statistics. Specifically, he cited 16 examples of the consequences of ignoring distributions with fat tails from econometrics and social sciences. He emphasized the disproportionate effect of rare events on statistically estimated parameters based on thin tails and the normality assumption. Furthermore, he expounded on the impossibility of empirically proving that an event would never happen. In conclusion, he highlighted that a seemingly impossible loss exceeding 10% was, in fact, probable. Further reading on Taleb's most recent work, *Statistical Consequences of Fat Tails* (Technical *Incerto* Collection), can be found on Academia.edu.

Among the Distinguished Professor's other recent activities were giving keynote addresses in such far-flung locales as Estonia, Las Vegas, Berlin, Tatarstan, Moscow, Gothenburg, Stockholm, Antwerp, and Brussels, as well as publishing multiple papers in such outlets as *Quantitative Finance*, *International Journal of Forecasting*, *Foresight: The International Journal of Applied Forecasting*, and *The Nobel Commission*.

Thanks to members of the Bulls and Bears Club for their help in preparing this coverage.



Department Chair Peter Carr

A Busy Season

Peter Carr is enjoying an eventful semester. His co-authored paper "Option Profit and Loss Attribution and Pricing: A New Framework," was recently accepted for publication in the *Journal of Finance*, and his forthcoming publications also include "DOL-Markovian Approximation of Rough Lognormal Model" and "Geometric Local Variance Gamma," both co-written with FRE adjunct faculty member Andrey Itkin.

He has also been traveling both far and wide, speaking at seminars at Columbia and Stern in New York City and journeying to Italy to keynote the AMACES conference in Perugia and lead a workshop at Polytechnico University in Milan. His other recent engagements included speaking on "Adding Optionality" at the Trading Show in New York and the Eastern Conference on Mathematical Finance in Boston; presenting a talk on using machine learning to predict realized variance for an audience at J.P. Morgan; and keynoting a University of Connecticut Mathematics Colloquium.

Professor Carr has also begun teaching a new Master's level class called "Static and Dynamic Hedging," which several practitioners are auditing. Before the coming holiday season, he will be keynoting the somewhat "unseasonably" named BBQ (Bloomberg Quant) Series, where his talk will be entitled "It Was 50 Years Ago Today," and the New Year will find him in Sanya, China, keynoting yet another high-profile event. No matter what the time of year, our department chair is in high demand!



New Open Floor Plan Fosters Collaborative Workspaces for the FRE Department

To keep up with the evolving physical needs of our ever-expanding graduate program, we have moved our offices to 1 Metrotech Center (north), 10th floor, gaining 50% more floor space in the process. The open floor plan boosts interaction and collaboration, which are valuable commodities for financial academics to remain competitive globally. The new space encourages creative thinking and innovative synergy to occur between students, teaching assistants, faculty, staff and visiting professors.





FALL 2019 LECTURE SERIES

Thursdays 6-7 PM • NYU Tandon Finance and Risk Engineering Department

SEPTEMBER 19

MakerSpace Event Space,
Rogers Hall, 1st Floor

"Who Ya Gonna Call"

Peter Cotton, J.P. Morgan

SEPTEMBER 26

LC 400, Dibner Bldg., 4th Floor

"XVA's"

John Hull, University of Toronto

OCTOBER 3

MakerSpace Event Space,
Rogers Hall, 1st Floor

*"The Adaptive Curve Evolution Model
for Interest Rates"*

Matthias Heymann, Goldman Sachs

OCTOBER 10

Pfizer Auditorium, Dibner Bldg., 1st Floor

*"From Systemic Risk to Supercooling
and Back"*

Mykhaylo Shkolnikov,
Bendheim Center for Finance
and Princeton University

OCTOBER 17

Pfizer Auditorium, Dibner Bldg., 1st Floor

*"Unspanned Risks, Negative Local
Time Risk Premiums, and Empirical
Consistency of Models
of Interest-Rate Claims"*

John Crosby, Smith School of Business,
University of Maryland

OCTOBER 24

Pfizer Auditorium, Dibner Bldg., 1st Floor

*"The Statistical Consequences
of Fat Tails"*

Nassim Taleb, Distinguished Professor,
NYU Tandon, FRE Department

OCTOBER 31

MakerSpace Event Space,
Rogers Hall, 1st Floor

"The Distortions of Finance"

Pasquale Cirillo,
Delft University of Technology

NOVEMBER 7

LC 400, Dibner Bldg., 4th Floor

Aparna Gupta,

Rensselaer Polytechnic Institute

NOVEMBER 14

MakerSpace Event Space,
Rogers Hall, 1st Floor

*"A Structural Model for Capital Market
Equilibrium"*

David Shimko, Industry Professor,
NYU Tandon, FRE Department

NOVEMBER 21

LC 400, Dibner Bldg., 4th Floor

*"Model Risk Management for Trading
Strategies Built with Deep Learning"*

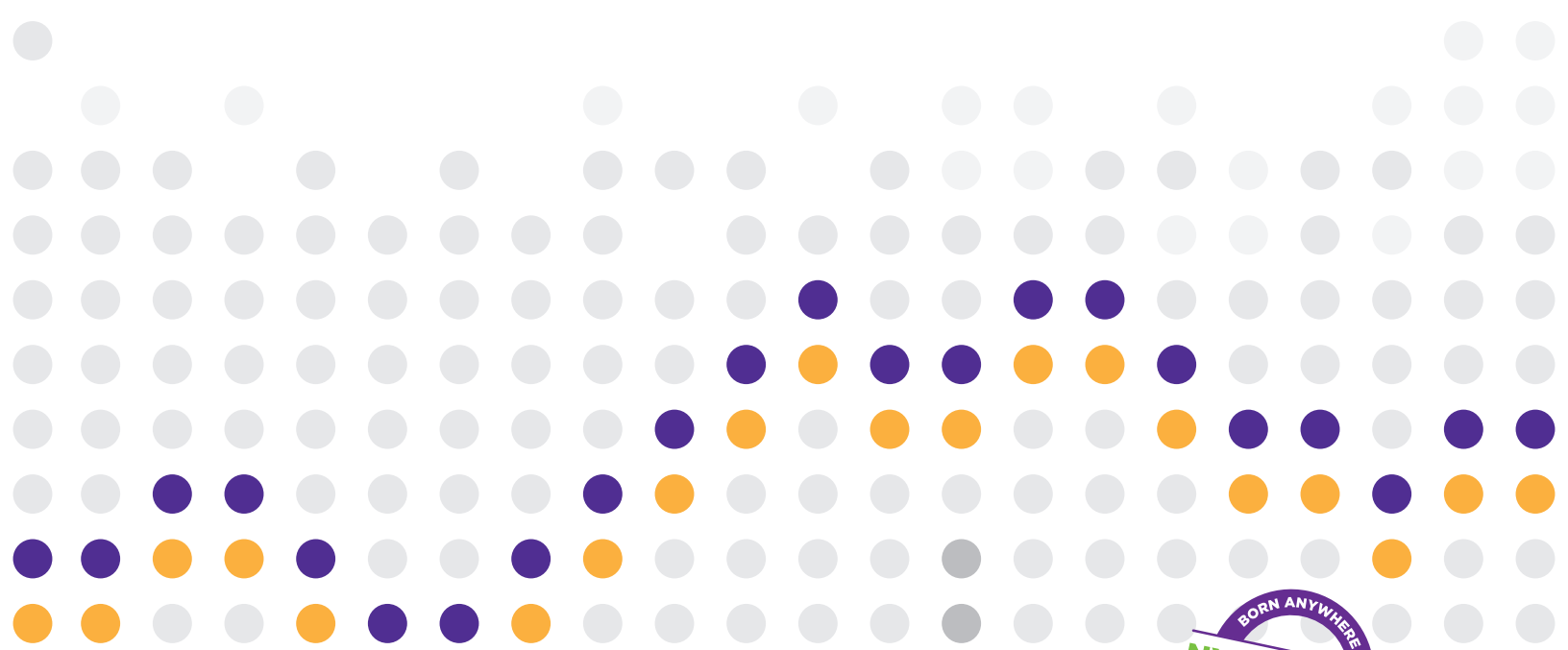
Ben Steiner, BNP Paribas

DECEMBER 5

MakerSpace Event Space,
Rogers Hall, 1st Floor

Yuewu Xu, Fordham University

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Brooklyn, NY 11201



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