Master of Science Program in Financial Mathematics

The Department of Mathematics (https://math.uchicago.edu/) offers a separate Master of Science in Financial Mathematics degree. Students of the Financial Mathematics Program (http://www-finmath.uchicago.edu/) develop a thorough understanding of the theoretical background of pricing models for financial derivatives and the underlying assumptions. Moreover, students learn to critically ascertain the applicability and limitations of these various models.

The Financial Mathematics Program offers accelerated, integrated coursework that explores the deep-rooted relationship that exists between theoretical and applied mathematics and the ever-evolving world of finance. Professionals from the financial industry instruct a significant number of classes in the program, using various methods to explore how models behave in practice under a variety of market conditions, as well as to evaluate the validity of underlying assumptions and consequential violations of these assumptions. Students will learn to use these models to set up and evaluate the effectiveness of hedges by simulating various market conditions.

Students are able to enroll in the In-Person Program or Online Program. Degree requirements are identical between modalities. The In-Person degree confers CPT and OPT, while the Online degree does not provide student visas or work authorization. Requirements of courses may differ between the two modalities, though learning outcomes are the same.

Full-time students of the In-Person Program typically complete the program in 15 months, including a summer practical experience and four academic quarters of course work. Full-time students of the Online Program can complete the program in one calendar year, given the offerings of summer courses to the online students. Part-time students, on average, complete either Program in two to three academic years. The Program must be completed within four academic years from the date of matriculation. For the convenience of our working students in the Online Program, classes meet for three hours on weekday evenings (6pm - 9pm). The In-Person program offers courses both during the evening hours, and throughout the day. All courses are reorded for review. Students are permitted to take 300 units for a non-quality Pass/Fail grade towards their degree completion.

Various software packages and data providers, (including Bloomberg terminals,) are licensed to the Program and will be provided free of charge.

The Financial Mathematics Program seeks candidates with a solid background in mathematics developed through majors such as mathematics, statistics, engineering, science, and economics. Additionally, relevant work experience and experience with computer programming skills, (including C++ and Python) are strongly taken into consideration by the Admissions Committee. We admit driven individuals that come from diverse educational, social, and geographic backgrounds. Candidates should be able to demonstrate excellence in both academics and leadership.

1250 units are needed to complete the Master of Science in Financial Mathematics:

- Foundations Courses - 350 units (https://finmath.uchicago.edu/curriculum/required-courses/)
- Elective Courses - 900 units (https://finmath.uchicago.edu/curriculum/electives-1/)

Concentrations

Financial Mathematics MS In-Person students may qualify for degree concentrations by completing concentration requirements as outlined below. Students are not required to have a concentration. Concentrations will be noted on student transcripts.

The following concentrations are available:

- **Financial Computing**
  300 units from: FINM 32600, 32700, 32900, 32950
- **Machine Learning and AI**
  300 units from: FINM 33160, 33165, 33170, 34700, 34800
- **Options and Derivatives**
  300 units from: FINM 32000, 34500, 37000, 37500
- **Rates and Credit**
  300 units from: FINM 31200, 35000, 35700, 37301, 37400
- **Trading**
  300 units from: FINM 33150, 35800, 35900, 35910, 37601

Project Lab

Project Lab allows students to work with industry partners on their firms' research projects. Students get to apply their coursework in new ways while getting a closer look at the challenges and opportunities in industry research. Project Lab is a 10-week collaboration, and each team is comprised of 4-6 students supported by a faculty advisor. The course (FINM 36000) is typically offered every quarter, and students apply to specific firm projects. The project concludes with a final presentation to the firm and completion of specific project deliverables. Project Lab is a repeatable course, as many students find it a valuable way to build industry experience throughout the program.

Financial Mathematics Courses

FINM 31200. Blockchains and Cryptoassets for Finance. 100 Units.
Since before the invention of reeding for the edges of coins, technology has been closely involved with money. The rise of cryptotokens and associated cryptocurrencies is the latest manifestation of their entanglement. This class is aimed at understanding crypto from the point of view of finance professionals. We will study some of the basic concepts in crypto, and then quickly move on to the world of smart contracts and emissions, cryptotokens' analogs to derivatives and interest-bearing securities.
Instructor(s): Brian Boonstra, William Cottrell Terms Offered: Autumn

FINM 32000. Numerical Methods. 100 Units.
Implementing the theory introduced in Mathematical Foundations of Option Pricing (FINM 33000), this course takes a numerical/computational approach to the pricing and hedging of financial derivatives. Topics include: Trees as diffusion approximations; Finite difference methods for PDE solution; Monte Carlo methods for simulation; Fourier transform methods for pricing.
Instructor(s): R. Lee Terms Offered: Spring
Note(s): Computing.

FINM 32400. Python for Financial Data Science. 100 Units.
TBD
Terms Offered: Autumn

FINM 32500. Computing for Finance in Python. 100 Units.
This course is designed for students with prior programming experience who aim to become buy-side or sell-side quants or quant developers. You'll learn Python by building the actual tools used on trading desks: from data pipelines and backtesters to live trading engines. By the end of the term, you will: •
Instructor(s): Sebastien Donadio Terms Offered: Autumn

FINM 32600. Computing for Finance in C++ 100 Units.
This course introduces C++ from the ground up, emphasizing the features of modern C++ used to build reliable, high-performance applications in quantitative finance. Students gain a hands-on foundation in advanced C ++ programming while learning industry-standard software engineering practices. Financial applications-including portfolio management, option pricing, and risk analysis-serve as the motivating examples throughout. In addition to core C++ programming, the course introduces two major AI paradigms-supervised learning and reinforcement learning (RL)-in an accessible manner. These topics illustrate how AI techniques can be integrated into financial applications such as portfolio allocation and decision-making, further demonstrating the versatility and relevance of modern C++ in quantitative workflows. Designed for both beginners with no prior C++ experience and students seeking a systematic introduction to modern C++, the course adopts a practical, problem-driven approach. Real-world quantitative finance problems are used to introduce programming fundamentals, modern language features, object-oriented design, generic programming, and the full software development life cycle. Students learn to write high-quality code using proper programming practices, including testing and iterative refinement. We begin with straightforward baseline implementations that all students can understand, then enhance and extend them step-by-step using more advanced concepts and features.
Instructor(s): C. Liyanaarachchi Terms Offered: Winter

FINM 32700. Advanced Computing for Finance. 100 Units.
This course is intended to teach programming concepts and techniques to students desiring to work in the financial sector. At the end of this class, students will have the necessary programming skills to be successful in their daily activities. We will cover the required skills to work as a quantitative researcher: advanced data structures (STL, Boost), parallel programming, inter-process communication, linear algebra computation, simulation and modeling. We will work on several projects aimed at building several trading strategies using C+ +. Classes are taught using a combination of lectures and in class hands-on lab sessions.
Instructor(s): S. Donadio Terms Offered: Spring
Note(s): Student must take at least one of FINM 32600 and FINM 32700 towards computing requirement.

FINM 32900. Full-Stack Quantitative Finance. 100 Units.
Full Stack Quantitative Finance" is a hands-on course centered on a core set of fundamental tools common across financial computing and data science. That is, this course examines elements of the analytical pipeline, from data extraction and cleaning to exploratory analysis, visualization, and modeling, and finally, publication and deployment. It does so with the aim of teaching the tools and principles behind creating reproducible and scalable workflows, including build automation, dependency management, unit testing, the command-line environment, shell scripting, Git for version control, and GitHub for team collaboration. These skills are taught

through case studies, each of which will additionally give students practical experience with key financial data sets and sources such as CRSP and Compustat for pricing and financials, macroeconomic data from FRED and the BEA, bond transactions from FINRA TRACE, Treasury auction data from TreasuryDirect, textual data from EDGAR, and high-frequency trade and quote data from NYSE. Prior experience at an intermediate level with Python and the PyData stack is assumed.
Instructor(s): Jeremy Bejarano Terms Offered: Winter

FINM 32950. Introduction to HPC in Finance. 50 Units.
In this course, we delve into the realm of high-performance computing within finance applications. As the demand for speed and accuracy in financial calculations increases, whether it be margin calculations, calibrating Option pricing models, or training ML models, traditional sequential programming on single processors falls short. We explore the imperative of parallel computing technologies to address these challenges efficiently. Skills learned in this course: -Identification of performance bottlenecks in finance applications using a systematic approach. -C++ features for high performance -High performance using accelerator and parallel programming solutions: Threads, -OpenMP, Intel oneAPI, GPGPU (CUDA), and advanced Python Solutions -Adoption of a pattern-based approach to design concurrency and parallelism into programs systematically. -Opportunity to learn and work with Linux OS (Linux is very widely used in the industry). Through hands-on exercises and real-world finance applications, students gain practical insights and immediately applicable skills. Access to state-of-the-art computing resources is provided through the University's Research Computing Center, eliminating the need for specialized hardware or software purchases. By the course's conclusion, students emerge equipped to tackle performance challenges head-on, making them valuable assets in any finance team or research project. Early registration is encouraged to ensure seamless access to resources.
Instructor(s): C. Liyanaarachchi Terms Offered: Spring
Note(s): Counts towards elective requirement.

FINM 33000. Options. 100 Units.
Introduction to the theory of arbitrage-free pricing and hedging of financial derivatives. Topics include: Arbitrage; Fundamental theorems of asset pricing; Binomial and other discrete models; Black-Scholes and other continuous-time Gaussian models in one-dimensional and multidimensional settings; PDE and martingale methods; Change of numeraire. Program requirement.
Instructor(s): Roger Lee Terms Offered: Autumn

FINM 33100. Foundations of Applied Machine Learning. 50 Units.
This course introduces core machine learning methods, with applications drawn from financial datasets such as cross-sectional equity returns. The emphasis is on understanding how standard machine learning tools behave in high-dimensional, noisy, and time-dependent settings. Rather than surveying many algorithms, the course focuses on a small set of foundational methods: linear models, dimensionality reduction, tree-based methods, and neural networks. A central theme is the challenge of extracting signal from noisy data, and the importance of careful model validation. By the end of the course, students will: • Understand the principles of supervised learning and model evaluation • Recognize and mitigate overfitting in high-dimensional settings • Apply regularized linear models to panel data • Use dimensionality reduction techniques (e.g., PCA) to uncover structure • Implement and interpret modern tree-based methods (e.g., gradient boosting) • Understand neural networks as tools for learning representations • Evaluate models using appropriate validation techniques for time-dependent data
Terms Offered: Summer

FINM 33150. Quantitative Trading Strategies. 100 Units.
Quantitative trading strategies, employing investment decisions based on model output, are a major component of business operations in the finance industry worldwide. We will present the major components of these strategies as found in several asset classes (equities, futures, credit, FX, interest rates and energy). A large proportion of the models involved in quantitative strategies are expressible in terms of regressions. We will cover most of the ways they are used, including practical tricks and considerations, and concentrating particularly on achieving trustworthy performance. Mathematically, we will cover the computation of linear regressions with and without weights, in univariate and multivariate cases, having least squares or other objective functions. Of the major computation technologies actively used by the finance industry (C/C++, Matlab, Java, R, VB/Excel, C\#, Python) we have chosen R and Python for numerical computation, with (very) light usage of Excel and with data coming from Quandl and some proprietary sources. Program requirement.
Instructor(s): B. Boonstra Terms Offered: Winter

FINM 33160. Machine Learning in Finance. 100 Units.
The course is an introduction to using Machine Learning models to predict stock performances, based on a number of fundamental factors. We will use a large dataset of financial ratios for about 4000 companies over a 10 year period, These ratios are computed from the quarterly reports issued by every publicly traded company. We train the models to try to predict the company's performance during the quarter until the next earnings release. We start with a simple DecisionTree model and sequentially introduce more and more advanced models such as BaggingTrees, RandomForests, Boosting Models … We explain the Mathematics behind these models and we will code some of them from scratch using Python. We will also learn to calibrate the models, doing hyper-parameter optimization and feature selection. Each model is run through a simple back-tester to judge performance against

a benchmark. At the end of the course we will do an introduction to Neural Nets, using the Pytorch framework, and show some applications .
Instructor(s): N. Nygaard Terms Offered: Winter
Prerequisite(s): FINM 32500 or Python waiver.

FINM 33165. Reinforcement Learning and Deep Learning. 100 Units.
Reinforcement Learning (RL) is actually quite an old discipline, going back to WW2. The fundamental equation, the Bellman Equation, goes back to those times. With the development of Machine Learning and Neural Networks, RL has re-emerged as an important tool in Artificial Intelligence (AI). The first breakthrough came when the DeepMind group was able to use RL to teach a computer to play some of the classical Atari games at a super-human level. The big eye-opener came when DeepMind wrote AlphaGO, a program that can play the game of GO at a level where it is able to beat world champion GO players Recently RL has been used in the latest versions of some of the Large Language Models (LLMs) such as ChatGPT, Grok3, and in particular DeepSeek . RL models are now widely used in LLM code generation and to make LLM responses more human-like.
Instructor(s): N. Nygaard Terms Offered: Autumn
Prerequisite(s): FINM 33160 or Consent of Instructor

FINM 33200. Generative and Agentic AI for Finance. 100 Units.
Generative and agentic AI is expanding the toolbox of the quantitative practitioner. This course focuses on the application layer of the AI stack-from consumer-facing tools like Claude Code and Cursor to developer-facing infrastructure: LLM APIs (OpenAI, OpenRouter), agentic frameworks (LangGraph), vector databases, and the Model Context Protocol (MCP). Topics progress from prompt engineering and API programming to agentic architectures that connect LLMs to financial databases and analytical pipelines. Finance applications include extraction of structured data from SEC filings, Deep Research agents that produce analystgrade reports, and reinforcement learning for trading decisions. The course is taught through weekly hands-on exercises where students build agentic workflows, culminating in a final project. There is no final exam. Prior completion of FINM 32900 (Full-Stack Quantitative Finance) is recommended. Prerequisites include advanced Python proficiency and basic backgrounds in statistics and finance.
Instructor(s): Jeremy Bejarano and Mark Hendricks Terms Offered: Spring

FINM 34000. Probability and Stochastic Processes. 50 Units.
This course provides a mathematical introduction to probability and stochastic processes. While the main focus is discrete probability and combinatorial analysis, some continuous probability is discussed. Examples and applications are emphasized over theory.
Instructor(s): Greg Lawler Terms Offered: September
Note(s): Foundations

FINM 34500. Stochastic Calculus. 100 Units.
The course starts with a quick introduction to martingales in discrete time, and then Brownian motion and the Ito integral are defined carefully. The main tools of stochastic calculus (Ito's formula, Feynman-Kac formula, Girsanov theorem, etc.) are developed. The treatment includes discussions of simulation and the relationship with partial differential equations. Some applications are given to option pricing, but much more on this is done in other courses. The course ends with an introduction to jump process (Levy processes) and the corresponding integration theory. Program requirement.
Instructor(s): G. Lawler Terms Offered: Winter
Equivalent Course(s): STAT 39000

FINM 34510. Stochastic Calculus I. 50 Units.
The course starts with a quick introduction to martingales in discrete time, and then Brownian motion and the Ito integral are defined carefully. The main tools of stochastic calculus (Ito's formula, Feynman-Kac formula, Girsanov theorem, etc.) are developed. The treatment includes discussions of simulation and the relationship with partial differential equations. Some applications are given to option pricing, but much more on this is done in other courses. The course ends with an introduction to jump process (Levy processes) and the corresponding integration theory.
Terms Offered: Winter
Prerequisite(s): Consent of instructor.
Equivalent Course(s): STAT 39010

FINM 34600. The Analysis of High Frequency Data. 100 Units.
This course is an introduction to the econometric analysis of high-frequency financial data. This is where the stochastic models of quantitative finance meet the reality of how the process really evolves. The course is focused on the statistical theory of how to connect the two, but there will also be some data analysis. With some additional statistical background (which can be acquired after the course), the participants will be able to read articles in the area. The statistical theory is longitudinal, and it thus complements cross-sectional calibration methods (implied volatility, etc.). The course also discusses volatility clustering and market microstructure.
Terms Offered: Winter
Prerequisite(s): Some statistics/econometrics background as in STAT 24400–24500, or FINM 33150 and FINM 33400, or equivalent, or consent of instructor.
Equivalent Course(s): STAT 33910

FINM 34700. Multivariate Statistical Analysis: Applications and Techniques. 100 Units.
This course focuses on applications and techniques for analysis of multivariate and high dimensional data. Beginning subjects cover common multivariate techniques and dimension reduction, including principal component analysis, factor model, canonical correlation, multi-dimensional scaling, discriminant analysis, clustering, and correspondence analysis (if time permits). Further topics on statistical learning for high dimensional data and complex structures include penalized regression models (LASSO, ridge, elastic net), sparse PCA, independent component analysis, Gaussian mixture model, Expectation-Maximization methods, and random forest. Theoretical derivations will be presented with emphasis on motivations, applications, and hands-on data analysis.
Instructor(s): M. Wang Terms Offered: Spring
Prerequisite(s): (STAT 24300 or MATH 20250) and (STAT 24500 or STAT 24510). Graduate students in Statistics or Financial Mathematics can enroll without prerequisites.
Equivalent Course(s): STAT 24620, STAT 32950

FINM 34800. Modern Applied Optimization. 100 Units.
This course assumes no background in optimization. The focus will be on various classical and modern algorithms, with a view towards applications in finance, machine learning, and statistics. In the first half of the course we will go over classical algorithms: univariate optimization and root finding (Newton, secant, regula falsi, etc), unconstrained optimization (steepest descent, Newton, quasi-Newton, Gauss-Newton, Barzilai-Borwein, etc), constrained optimization (penalty, barrier, augmented Lagrangian, active set, etc). In the second half of the course we will cover algorithms that have become popular over the last decade: proximal algorithms, stochastic gradient descent and variants, algorithms that involve moments or momentum or mirror, etc. Applications to machine learning and statistics will include ridge/lasso/logistic regression, support vector machines with hinge/sigmoid loss, optimal experimental designs, maximum entropy, maximum likelihood, Gaussian covariance estimation, feedforward neural networks, etc. Applications in finance will include Markowitz classical portfolio optimization, portfolio optimization with diversification or loss risk constraints, bounding portfolio risks with incomplete covariance information, log optimal investment strategy, etc.
Instructor(s): Lek-Heng Lim Terms Offered: Autumn
Equivalent Course(s): CAAM 31001, STAT 31001

FINM 35000. Topics in Economics. 100 Units.
This course introduces some fundamental macroeconomic theories and empirical studies that are relevant to finance. We will cover money, monetary policy, international finance, commercial and central banking, interest rates in the context of the loanable funds market, and risk premiums in the context of the stochastic discount factor.
Terms Offered: Autumn
Note(s): Elective

FINM 35600. Institutional DeFi: Liquidity Pricing and Deal Design. 50 Units.
This practitioner-led course teaches graduate students how institutional trading firms structure, price, and deliver liquidity solutions for digital asset protocols. The course bridges quantitative finance-options pricing, delta hedging, cost of capital analysis, KPI calibration-with the applied business of building and operating a liquidity provision practice. Students will learn to evaluate deal economics using trading-desk metrics (ROC, cost of capital, capital velocity), value token-based compensation as embedded options and understand how market makers monetize those options through gamma scalping, design deliverable KPI schedules calibrated to empirical market data, analyze mechanism design risk across protocol architectures (redemption windows, bridge failures, oracle manipulation, validator concentration), and construct complete commercial proposals for multi-service protocol engagements. Case studies progress from structured computation to open-ended analysis and executive communication. The central insight of the course is that institutional market making is increasingly a structured products business: trading firms deploy quantitative infrastructure not just to capture spread, but to fulfill contracted service obligations where the revenue is deterministic. A protocol paying $100K for a defined liquidity service is often more capital-efficient than deploying the same balance sheet into a trading strategy with a comparable expected return but meaningful variance.
Terms Offered: Summer

FINM 35700. Credit Markets. 100 Units.
The course objective is to introduce students to basic concepts on pricing, trading and portfolio risk management for credit instruments. The focus will be on liquid on cash corporate bonds, credit default swaps, credit indices and ETFs. Various trading strategies will be discussed with market practitioners, for a better insight into the "daily activity" of credit trading desks.
Terms Offered: Spring
Prerequisite(s): FINM 37400: Fixed Income

FINM 35900. Macro Finance. 50 Units.
A significant goal of this course is to give you quantitative work while simultaneously evaluating you on your ability to communicate, present and discuss your conclusions, work and ideas. In addition, to pair with the quant skills you should be honing throughout the program (and in this course), this course seeks to give additional intuition and narrow the gap between economic theory and practical industrial application. Objectives
● Understand what macro finance is and the relationship between the macroeconomy and financial markets,

and how these give rise to a natural backdrop of investing across asset classes. ● Understand how macro and multi-asset investors approach investing differently from investing in a single asset class. ● Understand examples of both the approach to building and the optimal execution and implementation of macro/multi-asset trading strategies. ● Generate your own macro/multi-asset trading strategies. ● Understand it is essential that risk managers understand macroeconomic variables, their cross-asset implications and spillovers, and how doing so drastically improves their management of risk. ● Conduct your own risk analysis from the perspective of a macro/multi-asset risk manager.
Instructor(s): Ian Wright Terms Offered: Spring

FINM 35910. Building and Pitching Trading Strategies. 50 Units.
Building and Pitching Trading Strategies prepares graduate students to function like real-world quantitative traders and portfolio managers. Students learn how to research, design, and implement systematic trading strategies built upon rigorous mathematical reasoning and industry-aligned standards. Core concepts include signal development, market microstructure, statistical modeling, risk management, and robust back-testing frameworks. This course pushes beyond model construction. Students will learn to communicate investment ideas with clarity and conviction, developing the leadership presence required to secure capital and stakeholder support in highly competitive markets. They will study best practices drawn from successful hedge fund managers, proprietary trading firms, and elite global exchanges. The ultimate goal of this course is to equip students with both technical capability and presentation excellence so they feel confident stepping onto a trading floor or into an investor meeting ready to win support for their ideas for their head traders, owners and/or investors.
Instructor(s): Chris Gersch Terms Offered: Autumn

FINM 36000. Project Lab. 50 Units.
This course is open to only FINM students. Program elective.
Instructor(s): Mark Hendricks, Roger Lee Terms Offered: Autumn Spring Summer Winter
Prerequisite(s): Consent of instructor.

FINM 36001. Project Lab 2. 000 Units.
This course is open to only FINM students. Program elective.
Instructor(s): Mark Hendricks, Roger Lee Terms Offered: Autumn Spring Summer Winter

FINM 36700. Portfolio and Risk Management. 100 Units.
The course begins by covering the classic foundations of portfolio theory, including mean-variance mathematics and the standard equity factor models used in attribution and risk management. It goes beyond these classic results to cover return dynamics, statistical uncertainty, model selection, market frictions, and non-convex optimization. Throughout, the course examines issues of application and implementation relevant for professionals in various areas of quantitative finance. Case studies cover a range of asset classes, investment strategies, and industries.
Instructor(s): Mark Hendricks Terms Offered: Autumn
Note(s): Program requirement.

FINM 37000. Futures and Related Derivatives. 50 Units.
This course will serve as an introduction to futures and related derivatives by providing a survey of models and tools that are useful to a quantitative analyst working with these products. In addition to covering the structures of various futures markets, the course will emphasize options on futures and methods for measuring volatility. These markets have a variety of quantitative problems, so the course will cover a broad selection of useful tools from linear algebra, stochastic processes, Monte Carlo methods, and machine learning with an emphasis on how to apply these methods in Python.
Instructor(s): Eric Patterson Terms Offered: Autumn

FINM 37301. Foreign Exchange: Markets, Pricing and Products. 50 Units.
This course will examine international currency markets, financial products, and applications of quantitative models with an emphasis on the quantitative methods and derivative products in common use today. Topics will include a) pricing for FX products in theory and in practice, specifically spot, forward, futures, deposits, cross-currency swaps, non-deliverable contracts, and FX options, b) FX markets in practice, exchange rate regimes, international monetary systems, FX modeling and forecasting, and c) practical market applications of FX options, exotic options, and hybrid products.
Instructor(s): Anthony Capozzoli Terms Offered: Winter
Note(s): Counts towards elective requirement. This is a five-week course taught in the second-half of the quarter.

FINM 37400. Fixed Income. 50 Units.
This course covers the mathematical modeling, statistical analysis, and market features relevant for pricing and managing fixed income products. Key topics include the following: the yield curve; interest-rate risk via duration, convexity, and factor approaches; fixed-income products such as swaps, caps, and floors; trading strategies for rates, including inflation and the Expectations Hypothesis. This course does not cover specialized models for analyzing fixed-income derivatives nor the issue of credit-risk. But it covers many fundamentals needed for those courses. The course uses weekly homework assignments consisting of applied problems that use real data and consider actual cases of fixed income risk, pricing, and trading. The course also has a final exam.

Instructor(s): Mark Hendricks Terms Offered: Winter

FINM 37500. Fixed Income Derivatives. 50 Units.
Fixed Income Derivatives will cover the mathematical pricing of fixed income derivatives, as well as their use in practice. Applications will include trading and hedging.
Instructor(s): Mark Hendricks Terms Offered: Winter

FINM 37601. Mathematical Market Microstructure: An Optimization Approach. 100 Units.
Mathematical Market Microstructure: An Optimization Approach for Dynamic Inventory Management and Market Maker Quoting. This course is an introduction to mathematical theory of market microstructure, with key applications in solving optimal execution problems with inventory management. We will start from discussions of market design, global market structure, algorithmic trading and market making practices. We will then present traditional market microstructure theory in the context of dealer inventory management and information-based quoting and pricing. Latest literature about realized volatility calculations and intraday implied volatility surface modeling using high-frequency data will be reviewed. The subject of order book dynamics research with applications to market impact modeling will be discussed as well. Finally, a review on continuous-time stochastic control theory will be provided and a discussion will be given on execution algorithm development and market making strategy design using stochastic programming techniques. The main goal of this course is to provide a clear discussion on key mathematical treatments and their practical applications of market microstructure problems, in particular relating to price discovery and utility optimization for certain transaction processes with non-trivial transaction cost present. Program elective.
Instructor(s): H. Chou Terms Offered: Autumn

FINM 38000. Financial Mathematics Practicum. 25 Units.
Program elective.
Instructor(s): Mark Hendricks Terms Offered: Autumn Spring Summer Winter

FINM 38001. Financial Mathematics Practicum II. 50 Units.
Program elective.
Instructor(s): Mark Hendricks Terms Offered: Autumn Spring Summer Winter

FINM 38500. Career Seminar. 000 Units.
Presentations/workshops/networking events related to career development in quantitative finance. Program requirement.
Instructor(s): Career Development Office Terms Offered: Autumn Spring Winter

FINM 38800. Financial Mathematics Seminar. 000 Units.
TBD
Instructor(s): Meredith Hajinazarian Terms Offered: Autumn Spring Winter