Financial Engineering

The Berkeley Master of Financial Engineering (MFE) degree offers two options of study: one-year graduate degree option and our part-time degree option (completed over two-years). Both are offered by the Haas School of Business and cover the same curriculum. Students enrolled in the MFE Program learn to combine finance, mathematics, data science and machine learning, and computer programming skills to optimize decision making. They enter careers in areas like portfolio management, trading, data science, quantitative research, and development, as well as strats and modeling among many others.

Graduates of the MFE Program find positions in hedge funds, fintech firms, commercial and investment banking, insurance and reinsurance, corporate treasuries, private equity and asset management. Specializations include asset/liability modeling/optimization, security structuring, derivative valuation, sales and trading, consulting, asset management, research, option-based securities valuation, special hedging, real-option investment analysis, and risk management.

Admission to the Program

Please visit the departmental website at mfe.haas.berkeley.edu (http://mfe.haas.berkeley.edu) for more information.

Applying for Graduate Admission

Thank you for considering UC Berkeley for graduate study! UC Berkeley offers more than 120 graduate programs representing the breadth and depth of interdisciplinary scholarship. The Graduate Division hosts a complete list (https://grad.berkeley.edu/admissions/choosing-your-program/list/) of graduate academic programs, departments, degrees offered, and application deadlines can be found on the Graduate Division website.

Prospective students must submit an online application to be considered for admission, in addition to any supplemental materials specific to the program for which they are applying. The online application and steps to take to apply can be found on the Graduate Division website (https://grad.berkeley.edu/admissions/steps-to-apply/).

Admission Requirements

The minimum graduate admission requirements are:

1. A bachelor's degree or recognized equivalent from an accredited institution;
2. A satisfactory scholastic average, usually a minimum grade-point average (GPA) of 3.0 (B) on a 4.0 scale; and
3. Enough undergraduate training to do graduate work in your chosen field.

For a list of requirements to complete your graduate application, please see the Graduate Division's Admissions Requirements page (https://grad.berkeley.edu/admissions/steps-to-apply/requirements/). It is also important to check with the program or department of interest, as they may have additional requirements specific to their program of study and degree. Department contact information can be found here (https://guide.berkeley.edu/graduate/degree-programs/).

Where to apply?

Visit the Berkeley Graduate Division application page (http://grad.berkeley.edu/admissions/apply/).

Unit Requirements: 28 Units

Curriculum

Required courses:		
MFE 230A	Investments and Derivatives	2,3
MFE 230D	Derivatives: Quantitative Methods	2
MFE 230E	Empirical Methods in Finance	2,3
MFE 230H	Financial Risk Measurement and Management	2
MFE 230I	Fixed Income Markets	2,3
MFE 230O	Applied Finance Project (1 or 3 units.)	1-3
MFE 230P	Financial Data Science	2
MFE 230Q	Stochastic Calculus with Asset Pricing Applications	2
Select electives from the following (not all courses are offered every year):		
MFE 230G	Equity and Currency Markets	2
MFE 230GA	Equity Markets	1
MFE 230GB	Currency Markets	1
MFE 230J	Financial Innovation with Data Science Applications	1-2
MFE 230K	Dynamic Asset Management	2
MFE 230M	Asset-Backed Security Markets	2
MFE 230S	Behavioral Finance	1,2
MFE 230T	Topics in Financial Engineering	1-5
MFE 230V	Credit Risk Modeling	2
MFE 230W	Accounting and Taxation of Derivatives	1
MFE 230X	High Frequency Finance	1,2
MFE 230Y	Ethics and Regulation in Financial Markets	1
MFE 230ZA	Deep Learning and Applications I	1
MFE 230ZB	Deep Learning and Applications II	1
MFE 293	Individually Supervised Study for Graduate Students	1-5

MFE Data Lab

Dedicated lab that includes the following resources: Bloomberg terminals (4), Access to FactSet, DataStream, Thompson Reuters, High Frequency trading server with NYSE TAQ, NASDAQ TotalView-ITCH, and ICAP EBS currency data; Software: SPSS, Mathematica, SAS, Visual Studio, EViews, RStudio, Anaconda, R, OneTick, kdb+, Rotman Interactive Trader, Numerix Bloomberg Edition, ETNA Trader, Kensho, and WRDS. Access to high-performance research cluster is available for individuals and for group scenarios.

Research Lab Manager

Dedicated staff member assists students with lab and technical needs. Depending on project needs, the lab manager provides appropriate resources for high-performance computing.

Business and Economics Library at the Haas School of Business

Access to Financial Times, Wall Street Journal, and all library resources.

1. Extensive assistance with placement in internship and full-time positions.

2. Workshops on job search skills, e.g., cover letter/resume writing and interviewing.

3. Financial Practice Seminars with professionals who discuss career paths available and industry needs. Workshops on relevant skills, e.g., programming languages.

For more information, visit the departmental website at mfe.haas.berkeley.edu (https://mfe.haas.berkeley.edu/).

Financial Engineering

Note: Not all courses are offered every year.

MFE 230A Investments and Derivatives 2 or 3 Units

Terms offered: Spring 2015, Spring 2013, Fall 2007
The course discusses the basic theories of asset pricing. It begins with the standard discounted cash flow analysis, and generalizes this approach to develop the No Arbitrage Pricing Technique for security valuation. Topics will be fixed income securities, derivatives, contingent claims, basic principles of optimal portfolio theory, models of equilibrium asset pricing, including CAPM and related Factor Models.
Hours & Format

Fall and/or spring: 8 weeks - 4-6 hours of lecture per week

Summer: 8 weeks - 4-6 hours of lecture per week

Additional Details

Subject/Course Level: Masters in Financial Engineering/Graduate

Grading: Letter grade.

MFE 230D Derivatives: Quantitative Methods 2 Units

Terms offered: Summer 2008 10 Week Session, Fall 2007, Summer 2007 10 Week Session
This course emphasizes the pricing of derivatives in continuous time, from the formulation of the pricing problem to the implementation of computational and numerical solution techniques.
Rules & Requirements

Prerequisites: 230A-230B

Hours & Format

Fall and/or spring: 8 weeks - 4 hours of lecture and 4 hours of lecture per week

Summer: 10 weeks - 3 hours of lecture per week

Additional Details

Subject/Course Level: Masters in Financial Engineering/Graduate

Grading: Letter grade.

MFE 230E Empirical Methods in Finance 2 or 3 Units

Terms offered: Spring 2020, Spring 2019, Spring 2018
This course reviews probability and statistical techniques commonly used in quantitative finance. It includes a review of normal, lognormal, CEV distribution, estimation and nonparametric techniques commonly used in finance (MLE, GMM, GARCH). Students will be introduced to financial databases and estimation application software to estimate volatilities and correlations and their stability.
Rules & Requirements

Prerequisites: Business Administration 230A-230B

Hours & Format

Fall and/or spring: 8 weeks - 4-6 hours of lecture and 1-1 hours of discussion per week

Summer: 8 weeks - 4-6 hours of lecture and 1-1 hours of discussion per week

Additional Details

Subject/Course Level: Masters in Financial Engineering/Graduate

Grading: Letter grade.

MFE 230G Equity and Currency Markets 2 Units

Terms offered: Fall 2015, Fall 2012, Fall 2006
This course reviews various aspects of equity and currency markets and their relative importance. It provides models of and historical evidence on the average returns and volatility of returns on equities, on the trade-to-trade equity price behavior, on trading volume and patterns, and primary financial risks. Determination of spot and forward rates and volatility, volume, high frequency dynamics and dealer behavior are examined.
Rules & Requirements

Prerequisites: Business Administration 230A-230B

Hours & Format

Summer: 7.5 weeks - 4 hours of lecture and 4 hours of lecture per week

Additional Details

Subject/Course Level: Masters in Financial Engineering/Graduate

Grading: Letter grade.

Formerly known as: Business Administration 230G

MFE 230GA Equity Markets 1 Unit

Terms offered: Prior to 2007

This course will cover active equity portfolio management including the more general quantitative theory of active management. We will view active management as an optimization problem trading off expected returns against risk and the cost of trading. Modules will cover forecasting returns, risk, and cost. We will also cover how to research active strategies and the analytics that support the enterprise. We will discuss various categories of active equity strategies and provide an introduction to current approaches.

Rules & Requirements

Credit Restrictions: Students will receive no credit for MFE 230GA after completing MFE 230G. A deficient grade in MFE 230GA may be removed by taking MFE 230G.

Hours & Format

Fall and/or spring: 3 weeks - 6 hours of lecture per week

Additional Details

Subject/Course Level: Masters in Financial Engineering/Graduate

Grading: Letter grade.

MFE 230GB Currency Markets 1 Unit

Terms offered: Prior to 2007

This course is dedicated to currency markets: market organization, determination of spot and forward rates, and links to international finance more broadly. Topics include: The FX market: organization, players, and instruments, FX arrangements and capital controls, Different approaches to exchange rate determination/forecasting, Conventional and unconventional monetary policy and exchange rate, Dominant currency paradigm/ dollar safety and FX Markets in the Post-COVID era.

Rules & Requirements

Credit Restrictions: Students will receive no credit for MFE 230GB after completing MFE 230G. A deficient grade in MFE 230GB may be removed by taking MFE 230G.

Hours & Format

Fall and/or spring: 3 weeks - 6 hours of lecture per week

Additional Details

Subject/Course Level: Masters in Financial Engineering/Graduate

Grading: Letter grade.

MFE 230H Financial Risk Measurement and Management 2 Units

Terms offered: Fall 2015, Fall 2012, Fall 2008

This course examines risk measurement and management including market risk, credit risk, liquidity risk, settlement risk, volatility risk, kurtosis risk and other types of financial risks. Topics will include risk management techniques for different types of contracts and portfolios such as duration, portfolio beta, factor sensitivities, VAR, dynamic portfolio analysis and extreme value analysis and other risk management techniques.

Rules & Requirements

Prerequisites: Business Administration 230A-230B

Hours & Format

Summer: 7.5 weeks - 4 hours of lecture and 4 hours of lecture per week

Additional Details

Subject/Course Level: Masters in Financial Engineering/Graduate

Grading: Letter grade.

Formerly known as: Business Administration 230H

MFE 230I Fixed Income Markets 2 or 3 Units

Terms offered: Fall 2007, Summer 2007 10 Week Session, Summer 2006 10 Week Session

This course provides a quantitative approach to fixed income securities and bond portfolio management. Topics include fixed income security markets, pricing and uses for portfolio management or for hedging interest rate risk, bond mathematics, term structure measurement and theory, immunization techniques, and the modern theory of bond pricing, and derivative instruments.

Rules & Requirements

Prerequisites: 230D

Hours & Format

Fall and/or spring: 8 weeks - 3-4 hours of lecture per week

Summer: 8 weeks - 3-4 hours of lecture per week

Additional Details

Subject/Course Level: Masters in Financial Engineering/Graduate

Grading: Letter grade.

MFE 230J Financial Innovation with Data Science Applications 1 - 2 Units

Terms offered: Fall 2015, Fall 2008, Fall 2006
This course will stress financial innovation in the traditional financial markets, and innovation opportunities in the newer disciplines of long and short term economic markets. Some examples of the later include livelihood insurance, home-equity insurance, inequality insurance, intergenerational social security, international agreements, and individual pension investment strategies.

Rules & Requirements

Prerequisites: Business Administration 230A-230B

Hours & Format

Fall and/or spring: 10 weeks - 1-3 hours of lecture per week

Summer: 8 weeks - 2-6 hours of lecture per week

Additional Details

Subject/Course Level: Masters in Financial Engineering/Graduate

Grading: Letter grade.

MFE 230K Dynamic Asset Management 2 Units

Terms offered: Spring 2015, Spring 2010, Spring 2009
This course reviews portfolio theory and pricing models. It includes: risk models for international portfolio returns, models of optimal allocation of funds, exchange rate uncertainty and criteria for judging the performance of managers and models; different types of portfolios/instruments, different types of applications, and strategies to achieve various investment objectives.

Rules & Requirements

Prerequisites: Business Administration 230A-230B

Hours & Format

Summer: 7.5 weeks - 4 hours of lecture and 4 hours of lecture per week

Additional Details

Subject/Course Level: Masters in Financial Engineering/Graduate

Grading: Letter grade.

Formerly known as: Business Administration 230K

MFE 230M Asset-Backed Security Markets 2 Units

Terms offered: Fall 2015, Spring 2015, Spring 2010
This course extends the study of fixed income securities to advanced topics on mortage and other asset-backed securities. Topics will include basic mechanics of structuring deals for mortgage-related securities, credit cards, leases, and other debt markets and the risk management techniques employed in the securitization process for these assets. The valuation of pooled assets and derivative bonds using Monte Carlo and option pricing techniques, and trading strategies are also evaluated.

Rules & Requirements

Prerequisites: Business Administration 230D and 230I

Hours & Format

Summer: 7.5 weeks - 4 hours of lecture and 4 hours of lecture per week

Additional Details

Subject/Course Level: Masters in Financial Engineering/Graduate

Grading: Letter grade.

Formerly known as: Business Administration 230M

MFE 230N Applied Finance Project 0.0 Units

Terms offered: Fall 2015, Fall 2012, Fall 2008
Students will be required to complete an applied quantitative finance project that explores a quantitative finance problem that might be met in practice and involves the development or use of quantitative financial technique.

Rules & Requirements

Prerequisites: Participation requires prior approval of the supervising faculty

Hours & Format

Summer: 7.5 weeks - 6 hours of lecture and 6 hours of lecture per week

Additional Details

Subject/Course Level: Masters in Financial Engineering/Graduate

Grading: Letter grade. This is part one of a year long series course. A provisional grade of IP (in progress) will be applied and later replaced with the final grade after completing part two of the series.

Formerly known as: Business Administration 230N-230O

MFE 230O Applied Finance Project 1 - 3 Units

Terms offered: Spring 2015, Spring 2010, Spring 2009
Students will be required to complete an applied quantitative finance project that explores a quantitative finance problem that might be met in practice and involves the development or use of quantitative financial technique.

Rules & Requirements

Prerequisites: Participation requires prior approval of the supervising faculty

Hours & Format

Summer: 7.5 weeks - 6 hours of lecture and 6 hours of lecture per week

Additional Details

Subject/Course Level: Masters in Financial Engineering/Graduate

Grading: Letter grade. This is part two of a year long series course. Upon completion, the final grade will be applied to both parts of the series.

Formerly known as: Business Administration 230N-230O

MFE 230P Financial Data Science 2 Units

Terms offered: Fall 2015
This course proposes a guided tour through optimization models arising in practical finance. These problems include ones that are traditionally associated with optimization, including asset and liability management, asset pricing, and portfolio optimization. We also describe optimization models arising in model calibration, predication and estimation, and risk analysis. The course includes some recent approaches to the analysis of other kinds of financial data, such as text (financial news) data.

Hours & Format

Summer: 6 weeks - 5 hours of lecture and 5 hours of lecture per week

Additional Details

Subject/Course Level: Masters in Financial Engineering/Graduate

Grading: Letter grade.

MFE 230Q Stochastic Calculus with Asset Pricing Applications 2 Units

Terms offered: Spring 2018, Spring 2015, Fall 2007
The course introduces the students to techniques from stochastic analysis employed in mathematical finance. Topics include: stochastic processes, brownian motion, stochastic integral, differentials and Ito's formula; martingales.

Hours & Format

Summer: 8 weeks - 4 hours of lecture per week

Additional Details

Subject/Course Level: Masters in Financial Engineering/Graduate

Grading: Letter grade.

MFE 230R Advanced Computational Finance 2 Units

Terms offered: Fall 2008, Fall 2006, Fall 2005
This course builds on the techniques learned in 230D, Quantitative Methods for Derivative Pricing. The focus is to gain a deeper analysis of numerical and computational issues in pricing and calibration. The orientation of the course is hands-on, with heavy use of computational techniques applied to case projects. The primary objective of this course is to prepare students to tackle the latest challenges in quantitative pricing that they are likely to encounter in cutting-edge financial institutions.

Rules & Requirements

Prerequisites: 230D

Hours & Format

Summer: 8 weeks - 2-4 hours of lecture and 2-4 hours of lecture per week

Additional Details

Subject/Course Level: Masters in Financial Engineering/Graduate

Grading: Letter grade.

MFE 230S Behavioral Finance 1 or 2 Units

Terms offered: Spring 2020, Spring 2019, Spring 2018
Over the last 25 years, psychologists have come to better understand the processes by which people make judgements and decisions. They have identified common judgement and decision heuristics and the biases associated with these. An understanding of one's own decision biases and those of others is an important tool for managers. Behavioral Decision Theory has also contributed to our understanding of financial markets. This course will discuss the common biases and heuristics.

Rules & Requirements

Prerequisites: 230D

Hours & Format

Fall and/or spring: 8 weeks - 4 hours of lecture, 4 hours of lecture, 1 hour of discussion, and 1 hour of discussion per week

Additional Details

Subject/Course Level: Masters in Financial Engineering/Graduate

Grading: Letter grade.

MFE 230T Topics in Financial Engineering 1 - 5 Units

Terms offered: Spring 2015, Summer 2013 10 Week Session, Fall 2012
Advanced study in the field of finance engineering that will address current and emerging issues. Topics will vary with each offering and will be announced at the beginning of each term.

Rules & Requirements

Repeat rules: Course may be repeated for credit when topic changes.

Hours & Format

Fall and/or spring: 15 weeks - 1-6 hours of lecture per week

Summer: 8 weeks - 2-12 hours of lecture per week

Additional Details

Subject/Course Level: Masters in Financial Engineering/Graduate

Grading: The grading option will be decided by the instructor when the class is offered.

MFE 230V Credit Risk Modeling 2 Units

Terms offered: Fall 2008, Fall 2005, Fall 2004
Focuses on the techniques currently used to model credit risk. The course will cover default probabilities, loss given default, correlation, credit portfolio analytics, bond valuation, loan valuation, and credit derivative valuation. Emphasis will be placed on model building, model validation, and interpreting model output. Students will be required to do some high-level programming in a package such as Matlab. Some empirical testing exercises will also be part of the project work.

Hours & Format

Summer: 8 weeks - 4 hours of lecture and 4 hours of lecture per week

Additional Details

Subject/Course Level: Masters in Financial Engineering/Graduate

Grading: Letter grade.

MFE 230VA Credit Risk: Economic Concepts 1 Unit

Terms offered: Spring 2010, Summer 2006 10 Week Session
Introduction to credit risk modeling and conceptual overview of current techniques. Covers default probabilities, loss given default, correlation, credit portfolio analytics, bond valuation, loan valuation, and credit derivative valuation. Prepares students who are interested in a second course that will focus on model building. Students not interested in the technical details of modeling but who desire an understanding of how credit risk modeling is used in practice will benefit from taking this course.

Hours & Format

Fall and/or spring: 6 weeks - 3 hours of lecture and 3 hours of lecture per week

Summer: 8 weeks - 4 hours of lecture per week

Additional Details

Subject/Course Level: Masters in Financial Engineering/Graduate

Grading: Letter grade.

MFE 230VB Credit Risk: Quantitative Modeling 1 Unit

Terms offered: Fall 2006
Focuses on the techniques currently used to model credit risk. The course will cover default probabilities, loss given default, correlation, credit portfolio analytics, bond valuation, loan valuation, and credit derivative valuation. Emphasis will be placed on model building, model validation, and interpreting model output. Students will be required to do some high-level programming in a package such as MATLAB. Some empirical testing exercises will also be part of the project work.

Hours & Format

Summer: 6 weeks - 3 hours of lecture and 3 hours of lecture per week

Additional Details

Subject/Course Level: Masters in Financial Engineering/Graduate

Grading: Letter grade.

MFE 230W Accounting and Taxation of Derivatives 1 Unit

Terms offered: Fall 2007, Summer 2007 10 Week Session, Summer 2006 10 Week Session
This course provides a framework to allow students the understanding of the accounting and tax issues related to derivatives and hedging. It also fulfills the needs of students seeking jobs in the corporate sector and/or seeking securities-structuring assignments in the financial services sector. A basic understanding of financial accounting is required.

Hours & Format

Summer: 8 weeks - 2.5 hours of lecture and 2.5 hours of lecture per week

Additional Details

Subject/Course Level: Masters in Financial Engineering/Graduate

Grading: Letter grade.

MFE 230X High Frequency Finance 1 or 2 Units

Terms offered: Spring 2015
This course introduces basic concepts of high frequency finance and discusses recent developments in market microstructure, electronic trading, and high frequency data modeling. Topics include trading basics and price discovery, distributional properties of financial time series, tick data analysis, trade direction algorithms, trading benchmarks, sources of risk, and trading strategies (including back-testing challenges, benchmark and hedging strategies, and arbitrage and program trading).

Hours & Format

Fall and/or spring: 10 weeks - 3 hours of lecture per week

Additional Details

Subject/Course Level: Masters in Financial Engineering/Graduate

Grading: Letter grade.

MFE 230Y Ethics and Regulation in Financial Markets 1 Unit

Terms offered: Prior to 2007

This course is an introduction to the legal rules which govern financial markets and institutions in general but also, specifically related to derivatives. The main purpose of legal rules and regulations is to ensure a smooth functioning of financial markets, as well as the safety and soundness of the overall financial system. We will examine the main areas of law and regulation, as they pertain to the centralized exchanges and the over the counter markets and the role of regulatory arbitrage. We will specifically focus on Dodd-Frank and Basel III and how these rules came about as a response to the financial crisis. We will also explore the role of ethics in filling in the gaps that the law fails to fill.

Hours & Format

Fall and/or spring: 6 weeks - 3 hours of lecture per week

Summer: 6 weeks - 3 hours of lecture per week

Additional Details

Subject/Course Level: Masters in Financial Engineering/Graduate

Grading: Letter grade.

MFE 230ZA Deep Learning and Applications I 1 Unit

Terms offered: Prior to 2007

Topics include supervised, unsupervised, and reinforcement learning industry tools to develop machine learning systems. Data collection and processing (APIs, web scraping, and Hadoop, MapReduce, Spark), multilayer perceptron (deep neural nets, training deep neural nets, convolutional, neural networks, recurring neural networks, Word2Vec). The course will end with a session on solving practical problems with deep learning.

Rules & Requirements

Prerequisites: MFE 230P or equivalent

Hours & Format

Fall and/or spring: 4 weeks - 4 hours of lecture per week

Additional Details

Subject/Course Level: Masters in Financial Engineering/Graduate

Grading: Letter grade.

MFE 230ZB Deep Learning and Applications II 1 Unit

Terms offered: Prior to 2007

Topics include spectral representation, long memory processes “shallow models”: ARMA, filter banks, SVR/SVM, random forests and Probabilistic graphical networks; deep models: RNNs and CNNs for sequential modeling, attention networks deep learning frameworks, basic models and causal loss functions for financial time-series prediction. Distributed representations of discrete entities and applications in Natural Language Processing data and model fusion strategies, irregular time series low cost modeling strategies (model compression, cascades and low rank modeling).

Rules & Requirements

Prerequisites: MFE 230P or equivalent

Hours & Format

Fall and/or spring: 4 weeks - 4 hours of lecture per week

Additional Details

Subject/Course Level: Masters in Financial Engineering/Graduate

Grading: Letter grade.

MFE W230A Investments and Derivatives 2 - 3 Units

Terms offered: Prior to 2007

The course discusses the basic theories of asset pricing. It begins with the standard discounted cash flow analysis, and generalizes this approach to develop the No Arbitrage Pricing Technique for security valuation. Topics will be fixed income securities, derivatives, contingent claims, basic principles of optimal portfolio theory, models of equilibrium asset pricing, including CAPM and related Factor Models.

Rules & Requirements

Credit Restrictions: Students will receive no credit for MFE W230A after completing MFE 230A. A deficient grade in MFE W230A may be removed by taking MFE 230A.

Hours & Format

Fall and/or spring: 8 weeks - 4-6 hours of web-based lecture per week

Summer: 8 weeks - 4-6 hours of web-based lecture per week

Online: This is an online course.

Additional Details

Subject/Course Level: Masters in Financial Engineering/Graduate

Grading: Letter grade.

MFE W230D Derivatives: Quantitative Methods 2 Units

Terms offered: Prior to 2007
This course emphasizes the pricing of derivatives in continuous time, from the formulation of the pricing problem to the implementation of computational and numerical solution techniques.
Rules & Requirements

Prerequisites: MFE 230A, MFA 230E, MFE 230Q. Co-requisite MFE 230I

Credit Restrictions: Students will receive no credit for MFE W230D after completing MFE 230D. A deficient grade in MFE W230D may be removed by taking MFE 230D.

Hours & Format

Fall and/or spring: 8 weeks - 4 hours of web-based lecture per week

Summer: 10 weeks - 3 hours of web-based lecture per week

Online: This is an online course.

Additional Details

Subject/Course Level: Masters in Financial Engineering/Graduate

Grading: Letter grade.

MFE W230E Empirical Methods in Finance 2 - 3 Units

Terms offered: Prior to 2007
This course reviews probability and statistical techniques commonly used in quantitative finance. It includes a review of normal, lognormal, CEV distribution, estimation and nonparametric techniques commonly used in finance (MLE, GMM, GARCH). Students will be introduced to financial databases and estimation application software to estimate volatilities and correlations and their stability.
Rules & Requirements

Prerequisites: MFE 230A-230B

Credit Restrictions: Students will receive no credit for MFE W230E after completing MFE 230E. A deficient grade in MFE W230E may be removed by taking MFE 230E.

Hours & Format

Fall and/or spring: 8 weeks - 4-6 hours of web-based lecture and 1-2 hours of web-based discussion per week

Summer: 8 weeks - 4-6 hours of web-based lecture and 1-2 hours of web-based discussion per week

Online: This is an online course.

Additional Details

Subject/Course Level: Masters in Financial Engineering/Graduate

Grading: Letter grade.

MFE W230G Equity and Currency Markets 2 Units

Terms offered: Prior to 2007
This course reviews various aspects of equity and currency markets and their relative importance. It provides models of and historical evidence on the average returns and volatility of returns on equities, on the trade-to-trade equity price behavior, on trading volume and patterns, and primary financial risks. Determination of spot and forward rates and volatility, volume, high frequency dynamics and dealer behavior are examined.
Rules & Requirements

Credit Restrictions: Students will receive no credit for MFE W230G after completing MFE 230G. A deficient grade in MFE W230G may be removed by taking MFE 230G.

Hours & Format

Fall and/or spring: 7 weeks - 4 hours of web-based lecture per week

Summer: 7 weeks - 4 hours of web-based lecture per week

Online: This is an online course.

Additional Details

Subject/Course Level: Masters in Financial Engineering/Graduate

Grading: Letter grade.

MFE W230H Financial Risk Measurement and Management 2 Units

Terms offered: Prior to 2007
This course examines risk measurement and management including market risk, credit risk, liquidity risk, settlement risk, volatility risk, kurtosis risk and other types of financial risks. Topics will include risk management techniques for different types of contracts and portfolios such as duration, portfolio beta, factor sensitivities, VAR, dynamic portfolio analysis and extreme value analysis and other risk management techniques.
Rules & Requirements

Credit Restrictions: Students will receive no credit for MFE W230H after completing MFE 230H. A deficient grade in MFE W230H may be removed by taking MFE 230H.

Hours & Format

Fall and/or spring:
7 weeks - 4 hours of web-based lecture per week
7 weeks - 4 hours of web-based lecture per week

Online: This is an online course.

Additional Details

Subject/Course Level: Masters in Financial Engineering/Graduate

Grading: Letter grade.

MFE W230I Fixed Income Markets 2 - 3 Units

Terms offered: Prior to 2007

This course provides a quantitative approach to fixed income securities and bond portfolio management. Topics include fixed income security markets, pricing and uses for portfolio management or for hedging interest rate risk, bond mathematics, term structure measurement and theory, immunization techniques, and the modern theory of bond pricing, and derivative instruments.

Rules & Requirements

Prerequisites: MFE 230D or MFE W230D

Credit Restrictions: Students will receive no credit for MFE W230I after completing MFE 230I. A deficient grade in MFE W230I may be removed by taking MFE 230I.

Hours & Format

Summer: 8 weeks - 4-6 hours of web-based lecture per week

Online: This is an online course.

Additional Details

Subject/Course Level: Masters in Financial Engineering/Graduate

Grading: Letter grade.

MFE W230J Financial Innovation with Data Science Applications 1 - 2 Units

Terms offered: Prior to 2007

This course will stress financial innovation in the traditional financial markets, and innovation opportunities in the newer disciplines of long and short term economic markets. Some examples of the later include livelihood insurance, home-equity insurance, inequality insurance, intergenerational social security, international agreements, and individual pension investment strategies.

Rules & Requirements

Credit Restrictions: Students will receive no credit for MFE W230J after completing MFE 230J. A deficient grade in MFE W230J may be removed by taking MFE 230J.

Hours & Format

Fall and/or spring: 7 weeks - 2-6 hours of web-based lecture per week

Summer: 7 weeks - 2-6 hours of web-based lecture per week

Online: This is an online course.

Additional Details

Subject/Course Level: Masters in Financial Engineering/Graduate

Grading: Letter grade.

MFE W230K Dynamic Asset Management 2 Units

Terms offered: Prior to 2007

This course reviews portfolio theory and pricing models. It includes: risk models for international portfolio returns, models of optimal allocation of funds, exchange rate uncertainty and criteria for judging the performance of managers and models; different types of portfolios/instruments, different types of applications, and strategies to achieve various investment objectives.

Rules & Requirements

Credit Restrictions: Students will receive no credit for MFE W230K after completing MFE 230K. A deficient grade in MFE W230K may be removed by taking MFE 230K.

Hours & Format

Fall and/or spring: 7 weeks - 4 hours of web-based lecture per week

Online: This is an online course.

Additional Details

Subject/Course Level: Masters in Financial Engineering/Graduate

Grading: Letter grade.

MFE W230M Asset-Backed Security Markets 2 Units

Terms offered: Prior to 2007

This course extends the study of fixed income securities to advanced topics on mortage and other asset-backed securities. Topics will include basic mechanics of structuring deals for mortgage-related securities, credit cards, leases, and other debt markets and the risk management techniques employed in the securitization process for these assets. The valuation of pooled assets and derivative bonds using Monte Carlo and option pricing techniques, and trading strategies are also evaluated.

Rules & Requirements

Credit Restrictions: Students will receive no credit for MFE W230M after completing MFE 230M. A deficient grade in MFE W230M may be removed by taking MFE 230M.

Hours & Format

Fall and/or spring: 7.5 weeks - 4 hours of lecture per week

Online: This is an online course.

Additional Details

Subject/Course Level: Masters in Financial Engineering/Graduate

Grading: Letter grade.

MFE W230O Applied Finance Project 1 - 3 Units

Terms offered: Prior to 2007
Students will be required to complete an applied quantitative finance project that explores a quantitative finance problem that might be met in practice and involves the development or use of quantitative financial technique.
Rules & Requirements

Prerequisites: Participation requires prior approval of the supervising faculty

Credit Restrictions: Students will receive no credit for MFE W230O after completing MFE 230O. A deficient grade in MFE W230O may be removed by taking MFE 230O.

Hours & Format

Fall and/or spring: 7 weeks - 3-6 hours of web-based lecture per week

Summer: 7 weeks - 3-6 hours of web-based lecture per week

Online: This is an online course.

Additional Details

Subject/Course Level: Masters in Financial Engineering/Graduate

Grading: Letter grade.

MFE W230P Financial Data Science 2 Units

Terms offered: Prior to 2007
This course proposes a guided tour through optimization models arising in practical finance. These problems include ones that are traditionally associated with optimization, including asset and liability management, asset pricing, and portfolio optimization. We also describe optimization models arising in model calibration, predication and estimation, and risk analysis. The course includes some recent approaches to the analysis of other kinds of financial data, such as text (financial news) data.
Rules & Requirements

Credit Restrictions: Students will receive no credit for MFE W230P after completing MFE 230P. A deficient grade in MFE W230P may be removed by taking MFE 230P.

Hours & Format

Summer: 5 weeks - 6 hours of web-based lecture per week

Online: This is an online course.

Additional Details

Subject/Course Level: Masters in Financial Engineering/Graduate

Grading: Letter grade.

MFE W230Q Stochastic Calculus with Asset Pricing Applications 2 Units

Terms offered: Prior to 2007
The course introduces the students to techniques from stochastic analysis employed in mathematical finance. Topics include: stochastic processes, brownian motion, stochastic integral, differentials and Ito's formula; martingales.
Rules & Requirements

Credit Restrictions: Students will receive no credit for MFE W230Q after completing MFE 230Q. A deficient grade in MFE W230Q may be removed by taking MFE 230Q.

Hours & Format

Fall and/or spring: 8 weeks - 4 hours of web-based lecture per week

Summer: 8 weeks - 4 hours of web-based lecture per week

Online: This is an online course.

Additional Details

Subject/Course Level: Masters in Financial Engineering/Graduate

Grading: Letter grade.

MFE W230S Behavioral Finance 1 - 2 Units

Terms offered: Prior to 2007
Over the last 25 years, psychologists have come to better understand the processes by which people make judgements and decisions. They have identified common judgement and decision heuristics and the biases associated with these. An understanding of one's own decision biases and those of others is an important tool for managers. Behavioral Decision Theory has also contributed to our understanding of financial markets. This course will discuss the common biases and heuristics.
Rules & Requirements

Prerequisites: MFE 230D or MFE W230D

Credit Restrictions: Students will receive no credit for MFE W230S after completing MFE 230S. A deficient grade in MFE W230S may be removed by taking MFE 230S.

Hours & Format

Fall and/or spring: 8 weeks - 2-4 hours of web-based lecture and 1-1 hours of web-based discussion per week

Online: This is an online course.

Additional Details

Subject/Course Level: Masters in Financial Engineering/Graduate

Grading: Letter grade.

MFE W230X High Frequency Finance 1 - 2 Units

Terms offered: Prior to 2007
This course introduces basic concepts of high frequency finance and discusses recent developments in market microstructure, electronic trading, and high frequency data modeling. Topics include trading basics and price discovery, distributional properties of financial time series, tick data analysis, trade direction algorithms, trading benchmarks, sources of risk, and trading strategies (including back-testing challenges, benchmark and hedging strategies, and arbitrage and program trading).
Rules & Requirements

Credit Restrictions: Students will receive no credit for MFE W230X after completing MFE 230X. A deficient grade in MFE W230X may be removed by taking MFE 230X.

Hours & Format

Fall and/or spring: 10 weeks - 3-6 hours of web-based lecture per week

Online: This is an online course.

Additional Details

Subject/Course Level: Masters in Financial Engineering/Graduate

Grading: Letter grade.

MFE 293 Individually Supervised Study for Graduate Students 1 - 5 Units

Terms offered: Fall 2015, Spring 2015, Fall 2012
Individually supervised study of subjects not available to students in the regular schedule, approved by faculty adviser as appropriate for the students' programs.
Rules & Requirements

Prerequisites: Graduate standing

Repeat rules: Course may be repeated for credit without restriction.

Hours & Format

Summer: 8 weeks - 1-5 hours of independent study and 1-5 hours of independent study per week

Additional Details

Subject/Course Level: Masters in Financial Engineering/Graduate

Grading: Letter grade.