Financial Engineering (MFE)

Courses

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MFE 230A Investments and Derivatives
2 or 3 Units
Terms offered: Spring 2015, Spring 2013, Spring 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.
Investments and Derivatives: Read More [+]

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.
Investments and Derivatives: Read Less [-]

MFE 230D Derivatives: Quantitative Methods
2 Units
Terms offered: Summer 2008 10 Week Session, Summer 2007 10 Week Session, Summer 2006 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.
Derivatives: Quantitative Methods: Read More [+]

Rules & Requirements
Prerequisites: 230A-230B

Hours & Format
Fall and/or spring: 8 weeks - 4-6 hours of lecture and 1-1 hours of discussion per week
Summer: 10 weeks - 3 hours of lecture per week

Additional Details
Subject/Course Level: Masters in Financial Engineering/Graduate
Grading: Letter grade.
Derivatives: Quantitative Methods: Read Less [-]

MFE 230E Empirical Methods in Finance
2 or 3 Units
Terms offered: Spring 2021, Spring 2020, Spring 2019
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.
Empirical Methods in Finance: Read More [+]

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.
Empirical Methods in Finance: Read Less [-]

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.
Equity and Currency Markets: Read More [+]

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
Equity and Currency Markets: Read Less [-]
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.
Financial Risk Measurement and Management: Read More [+]

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

Fixed Income Markets: Read Less [-]

MFE 230I Fixed Income Markets 2 or 3 Units
Terms offered: Summer 2007 10 Week Session, Summer 2006 10 Week Session, Summer 2005 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.
Fixed Income Markets: Read More [+]

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.
Formerly known as: Business Administration 230I

Fixed Income Markets: Read Less [-]

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.
Financial Innovation with Data Science Applications: Read More [+]

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.
Financial Innovation with Data Science Applications: Read Less [-]

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.
Dynamic Asset Management: Read More [+]

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

Dynamic Asset Management: Read Less [-]
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 mortgage 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.
Asset-Backed Security Markets: Read More [+]
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
Asset-Backed Security Markets: Read Less [-]

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.
Applied Finance Project: Read More [+]
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
Applied Finance Project: Read Less [-]

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.
Financial Data Science: Read More [+]
Rules & Requirements
Prerequisites: Business Administration 230N-230O
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.
Financial Data Science: Read Less [-]
**MFE 230Q Stochastic Calculus with Asset Pricing Applications 2 Units**
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.

**Terms offered:** Spring 2018, Spring 2015, Spring 2007

**Hours & Format**

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

**Additional Details**

- **Subject/Course Level:** Masters in Financial Engineering/Graduate
- **Grading:** Letter grade.

**Stochastic Calculus with Asset Pricing Applications:** Read More [+]

**MFE 230R Advanced Computational Finance 2 Units**

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.

**Terms offered:** Fall 2008, Fall 2006, Fall 2005

**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.

**Advanced Computational Finance:** Read Less [-]

**MFE 230S Behavioral Finance 1 or 2 Units**

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.

**Terms offered:** Spring 2020, Spring 2019, Spring 2018

**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.

**Behavioral Finance:** Read Less [-]

**MFE 230T Topics in Financial Engineering 1 - 5 Units**

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.

**Terms offered:** Spring 2015, Summer 2013 10 Week Session, Fall 2012

**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.

**Topics in Financial Engineering:** Read Less [-]
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.
Credit Risk Modeling: Read More [+]

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.
Credit Risk Modeling: Read Less [-]

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.
Credit Risk: Economic Concepts: Read More [+]

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.
Credit Risk: Economic Concepts: Read Less [-]

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.
Credit Risk: Quantitative Modeling: Read More [+]

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.
Credit Risk: Quantitative Modeling: Read Less [-]

MFE 230W Accounting and Taxation of Derivatives 1 Unit
Terms offered: Summer 2007 10 Week Session, Summer 2006 10 Week Session, Summer 2005 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.
Accounting and Taxation of Derivatives: Read More [+]

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.
Accounting and Taxation of Derivatives: Read Less [-]
MFE W230A Investments and Derivatives 2 - 3 Units
Terms offered: Not yet offered
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.
Investments and Derivatives: Read More [+]

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: Not yet offered
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.
Derivatives: Quantitative Methods: Read More [+]

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: Not yet offered
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.
Empirical Methods in Finance: Read More [+]

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.

Empirical Methods in Finance: Read Less [-]
MFE W230G Equity and Currency Markets 2 Units
Terms offered: Not yet offered
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.
Equity and Currency Markets: Read More [+]

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.

Equity and Currency Markets: Read Less [-]

MFE W230H Financial Risk Measurement and Management 2 Units
Terms offered: Not yet offered
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.
Financial Risk Measurement and Management: Read More [+]

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
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.

Financial Risk Measurement and Management: Read Less [-]

MFE W230I Fixed Income Markets 2 - 3 Units
Terms offered: Not yet offered
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.
Fixed Income Markets: Read More [+]

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.

Fixed Income Markets: Read Less [-]

MFE W230J Financial Innovation with Data Science Applications 1 - 2 Units
Terms offered: Not yet offered
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.
Financial Innovation with Data Science Applications: Read More [+]

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.

Financial Innovation with Data Science Applications: Read Less [-]
MFE W230K Dynamic Asset Management 2 Units

Terms offered: Not yet offered
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.
Dynamic Asset Management: Read More [+]

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.
Dynamic Asset Management: Read Less [-]

MFE W230O Applied Finance Project 1 - 3 Units

Terms offered: Not yet offered
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.
Applied Finance Project: Read More [+]

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.
Applied Finance Project: Read Less [-]
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.
Individually Supervised Study for Graduate Students: Read More [+]

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.

Individually Supervised Study for Graduate Students: Read Less [-]