Masters in Financial Engineering (MFE)

Courses

MFE 230A Investments and Derivatives 3 Units

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**

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.

Formerly known as: Business Administration 230A

MFE 230D Derivatives: Quantitative Methods 2 Units 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 Units

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 hours of lecture, 6 hours of lecture, and 1 hour of discussion per week

Additional Details

Subject/Course Level: Masters in Financial Engineering/Graduate

Grading: Letter grade.

Instructor: Valkanov

Formerly known as: Business Administration 230E

MFE 230F The Design of Securities for Corporate Financing 1 Unit The view of corporate finance presented in this course stems from an analysis of two related issues: 1) how firms create value, and 2) how corporate finance facilitates the process of value creation. As part of this process, we will examine the factors that help determine financial strategy, thereby putting the design of financial packages in perspective. In particular, the course focuses on how corporate financing needs lead to the need for financial engineering and spur financial innovation. **Rules & Requirements**

Prerequisites: 230D

Hours & Format

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

Additional Details

Subject/Course Level: Masters in Financial Engineering/Graduate

Grading: Letter grade.

MFE 230G Equity and Currency Markets 2 Units

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-totrade 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 230H Financial Risk Measurement and Management 2 Units 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

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 Success and Failure in Financial Innovation 1 Unit Students will participate in a series of case studies illustrating some of the major successes and failures of modern financial innovation. They will learn how to measure success and failure and discuss case studies in portfolio insurance, long-term capital management, mortgage-backed securitization, and corporate enterprise-wide risk control. **Rules & Requirements**

Prerequisites: Business Administration 230A-230B

Hours & Format

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

Additional Details

Subject/Course Level: Masters in Financial Engineering/Graduate

Grading: Letter grade.

Formerly known as: Business Administration 230J

MFE 230K Dynamic Asset Management 2 Units

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

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

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 2300 Applied Finance Project 1 - 3 Units

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 Optimization Models in Finance 2 Units

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.

Instructor: El Ghaoui

MFE 230Q Introduction to Stochastic Calculus 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.

Hours & Format

Summer: 8 weeks - 1-2 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 230Q

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.

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

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

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 as topic varies. 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

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

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

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 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

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 293 Individually Supervised Study for Graduate Students 1 - 5 Units 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. Course may be repeated for credit when topic changes.

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.