Curriculum

Designed by a world-class business school, the MFE Program's curriculum challenges you to think of innovative ways to integrate quantitative methods with the theoretical framework and institutional settings in which they are applied. Taught by a renowned faculty comprised of prominent scholars and industry luminaries, MFE courses are anchored in cutting-edge research and best practices in financial engineering.

The Berkeley MFE Program is a one-year program beginning in March, with an internship period from October to January, and graduation the following March.

Degree Requirements

MFE students must successfully complete 28 units of coursework (1 unit = 15 class hours), including the Morgan Stanley Applied Finance Project, plus an internship or on-site project. The 10- to 12-week internship project is a required condition for graduation.

Orientation

March 23 – 26, 2015

The program kicks off with an informative and social week-long orientation. During the week-long introduction to the program, you'll get to know other new students and gain a sense of what the classroom experience will hold. The orientation features team-building exercises and lectures, and workshops on special topics, including a thorough overview of the job market and career resources.

Spring Term

March 30– May 22, 2014 (8 weeks)

Investments and Derivatives

MFE 230A (3 units) - William Fuchs and Nicolae Garleânu

This course covers 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. Applications including fixed income securities, derivatives and contingent claims will be considered. The course will then examine the basic principles of optimal portfolio theory and consider special models of equilibrium asset pricing, including the Capital Asset Pricing Model and related Factor Models. Applications to equity pricing and portfolio performance evaluation will be explored. Programming and analytical exercises will be assigned.

Empirical Methods in Finance

MFE 230E (2 units) - Martin Lettau

This course reviews probability and statistical techniques commonly used in quantitative finance. It includes a review of normal, log-normal, and CEV distributions. This course covers estimation and non-parametric techniques commonly used in finance (MLE, GMM, GARCH) and introduces students to financial databases and to estimation application software for exercises in estimating volatilities and correlations and their stability.

Introduction to Stochastic Calculus

MFE 230Q (2 units) - Johan Walden

This course introduces the concepts and tools of stochastic calculus as required for effective pricing of complex financial derivatives in continuous time. The course stresses the practical applications of stochastic differential equations, Ito integrals, and measure transformations as required in advanced financial engineering practice and for the understanding of asset pricing theory. The material discussed in this course is used extensively in the some of the more advanced classes.

Positioning Yourself for Opportunities in the Financial World

MFE 230T (1 unit) - Linda Kreitzman

This course is exclusively designed for the Master of Financial Engineering (MFE) students or those interested in preparing for a career in finance. The goal of the course is to ensure your success as an MFE and beyond.

Financial Institutions Seminar I

Individuals from financial services firms will describe the work of financial engineers in their firms and the kinds of skills and personal attributes they are seeking for this work.

Summer Term

June 8 – August 1, 2015 (8 weeks)

Derivatives: Quantitative Methods

MFE 230D (2 units) - Eric Reiner

This course emphasizes the pricing of derivatives in continuous time, from the formulation of the pricing problem to the implementation of

[FIRST-PERSON]

Aude Barthelemy
MFE 13

Full time:
Associate, Derivative Analysis
Goldman Sachs
New York, New York

Internship:
Citigroup NY
New York, New York

"The Berkeley MFE Program helps us develop strong quantitative skills, but I believe what makes the program unique is the preparation for interviews and the 3-month internship in the fall. It allows us to apply the skills and tools that we learned during the first part of the program."

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- Placement Information
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- Admissions Criteria
- Attend an Info Session

computational and numerical solution techniques. The course consists of three parts. In the first part, asset pricing theory is used to set up the pricing problem for a wide range of instruments with features such as early exercise, jumps, and path dependencies. The second part focuses on simulation methods for pricing both European and early exercise derivatives. The third part shows how to effectively use advanced finite difference techniques for solving a wide array of pricing problems.

Fixed Income Markets

MFE 230I (2-3 units) - Richard Stanton

This course provides a quantitative approach to fixed income securities and bond portfolio management. The focus is on fixed income security markets, pricing and uses for portfolio management or for hedging interest rate risk. The course covers bond mathematics, term structure measurement and theory, immunization techniques and the modern theory of bond pricing, including the pricing of credit-risky bonds. It also covers derivative instruments (futures, swaps, options, exotic instruments). There will be extensive use of application and programming exercises.

Credit Risk Modeling

MFE 230V (2 unit) - Deepak Agrawal

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. Students will gain exposure to the practical challenges associated with building, testing, and using credit risk models currently used by banks and asset managers.

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Financial Institutions Seminar II

This is a weekly seminar in which informed observers and practitioners discuss trends in the provision of financial services, the information and computing systems being adopted, new product developments, regulatory issues, and similar topics.

Fall Term

August 17 – October 9, 2015 (8 weeks)

Required Course: (8 weeks)

Financial Risk Measurement and Management

MFE 230H (2 units) - Yu (Ben) Meng
This course examines financial risk measurement and management, including market risk, credit risk, liquidity risk, settlement risk, model risk, volatility risk, kurtosis risk and other types of financial risks. It includes risk measurement techniques for different types of contracts and portfolios (equity, fixed income, currency) such a duration, portfolio Beta, factor sensitivities, Value at Risk™, dynamic portfolio distribution analysis and extreme value analysis. It also includes risk management techniques for different types of problems such as trading desk risk management, total portfolio market exposure limits, counterpart credit exposure limits, and funding liquidity exposure limits.

Choose 5 units of electives:*

Financial Innovation in a Global Marketplace

MFE 230J (1 unit) - John O'Brien
Students will participate in a series of case studies illustrating some of the major successes and failures of modern financial innovation.

Optimization Models in Finance

MFE 230P (2 units) - Laurent El Ghaoui
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, prediction 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.

International Equity & Currency Markets

MFE 230G (2 units) - Michael Melvin and Ron Kahn
This course reviews various aspects of equity and currency markets and 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 on primary financial risks. The determination of spot and forward exchange rate and the volatility, volume, high frequency dynamics, and dealer behavior in currency markets are considered. Practical considerations involved in the implementation of various strategies are considered.

Independent Study

MFE293 (1 - 3 units) - Choose an advisor
The Independent Study course is your opportunity to do research in an area of interest to you, in which there are no existing courses.

Internship Period

October 20, 2014 – January 16, 2015 (12 weeks)
The Internship/Special Topics in Finance project is a required condition for graduation. The internship or approved, on-site project takes place from mid-October to mid-January. Students must enroll in MFE230N, the Internship/Special Topics in Finance course for the fall term.

Because of the school's reputation and close ties to the best firms, Haas has

an exceptional record of helping students secure internships, consistently placing nearly 100 percent of students each year.

Winter Term

January 19 – March 11, 2016 (8 weeks)

Required Courses:

Applied Finance Project

MFE 230O (3 units) - Eric Reiner
This is an applied project exploring an unresolved finance problem that is met in practice and involves the development or use of a quantitative financial technique. Participation requires prior approval of the supervising faculty member

Choose 4-6 units of electives:*

Asset Backed Security Markets

MFE 230M (2 units) - Nancy Wallace and Dwight Jaffee
This course extends the study of fixed-income securities to advanced topics on mortgage and other asset-backed securities. Students will apply the latest tools in fixed-income analysis and classic models in economics and finance to a critical evaluation of the structure and operation of the securitized bond markets. The course covers the 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 course will also consider the valuation of pooled assets and derivative bonds using both Monte Carlo and option pricing techniques, an analysis of the trading strategies that are employed in these markets, and a study of the market microstructure of asset-backed security markets.

Dynamic Asset Management

MFE 230K (2 units) - Kevin Kneafsey
Covers the strategies for achieving various investment objectives for portfolios/ instruments (equity, fixed income, currency, mortgages, non-traded assets) and applications (investment funds, pension funds, insurance companies, bank investment portfolios).

Behavioral Finance

MFE 230S (1 units) - Greg LaBlanc
This course covers elements of behavioral decision theory and its implication in financial markets. Focus is on the psychological processes by which people make judgments and decisions, and the heuristics and biases associated with these decisions.

High-Frequency Finance

MFE 230X (2 units) - Terry Hendershott and Xin Guo
This course covers topics in high frequency finance and discusses recent developments in market microstructure, electronic trading and data modeling. The course is aimed at students who are considering careers in financial engineering or quantitative trading at institutions involved in automated securities trading on electronic platforms.

Topics in Financial Engineering

The Topics course can change from year to year. For the 2015-2016 term:

Ethics and Regulations in Financial Markets

MFE230T (1 unit) - Greg Lablanc
This course is a basic 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.

Independent Study

MFE293 (1 - 3 units) - Choose an advisor
The Independent Study course is your opportunity to do research in an area of interest to you, in which there are no existing courses.

Financial Practice Seminars

MFE students are encouraged to attend weekly discussions held by finance practitioners. In the first term speakers discuss jobs available to graduates of the MFE and the skills needed to contribute to a firm's mission. In the second term, speakers provide insights into the way the financial world is changing: new products and needs; evolving data and information systems; and similar topics.

The Morgan Stanley Applied Finance Project

In addition to the internship, MFE students are required to complete an applied finance project that develops or uses quantitative finance tools and techniques learned in the program or internship. Students have the option of completing a one-credit project or three-credit project. The $5,000 Morgan Stanley Applied Finance Project Award is given to the best three-credit project.

*Please note that not all electives will be offered every year. This schedule is tentative and will be updated every term.

All examinations may be audio and videotaped for the purpose of assuring academic integrity.

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