▣ MFE Course Description

BIT500 Statistical Analysis for Management   1.5:0:1.5

This course is designed to provide the framework for statistical analysis to study finance. Topics such as statistical inference, hypothesis testing, and regression analysis will be discussed

BAF508 Stochastic Calculus for Finance   1.5:0:1.5

This course introduces martingales or Markov properties of stochastic processes. The most popular example of stochastic process is Brownian motion process is defined and Ito integration and Ito's lemma will be introduced.

BAF509 Fundamentals of Investment and Asset Pricing   1.5:0:1.5

This course covers the foundations of modern finance and asset pricing; introduction to financial economic approaches; portfolio theory and various pricing models; arbitrage and fundamental theorems of asset pricing; market efficiency issues; structural issues

BAF510 Analysis of Fixed Income Securities   1.5:0:1.5

This course is an introductory course on the subject of fixed income securities and associated markets. The characteristics of term structure and nature of interest rate changes are discussed. Also covered are yield curves, basic term structure theories, interest rate risk of fixed income, duration, convexity, and credit risk.

BAF511 Derivatives   1.5:0:1.5

Student will learn about the basic derivatives such as forward, futures and options contracts in this course. The topics discussed in this course will include the concepts, pricing, and hedging of the forward, futures and options contracts.

BAF502 Financial Accounting   3:0:3

This course examines basic concepts of financial accounting. This course provides a basic framework to understand the financial statement from the perspective of users. It also provides overview of the basic financial statements – income statement, balance sheets, and cash flow statement. This course also introduces students to the fundamentals of financial statement analysis (FSA) and valuation. After completing the course, a student is expected to interpret and analyze financial statements, and use financial statements for equity valuation.

BAF513 Computer Programming for Financial Engineering I   1.5:3:1.5

This course will teach various computer programming languages useful and necessary for financial engineering, and will help students to implement various financial engineering techniques and models using those programming languages.

BAF626 Modelling in Financial Engineering   1.5:0:1.5

This course is designed to provide the framework to model in financial engineering. Students will learn about the mathematics and modeling methods in financial engineering, and apply those to the

area of option pricing theory, bond pricing theory, and risk management.

BAF514 Computer Programming for Financial Engineering II   1.5:3:1.5
This course will teach various computer programming languages useful and necessary for financial engineering, and will help students to implement various financial engineering techniques and models using those programming languages.

BAF515 omputer Programming for Financial Engineering III   2:3:3
This course will teach various computer programming languages useful and necessary for financial engineering, and will help students to implement various financial engineering techniques and models using those programming languages.

BAF512 Applications in Stochastic Calculus for Finance   1.5:0:1.5
This course provides theoretical basis for risk-neutral valuation, connection to partial differential equation, and change of numeraire to price various exotic derivatives as well as plain vanilla options.

BAF627 Portfolio Optimization and Management   1.5:0:1.5
Methodologies and related issues of portfolio management is covered in this course. Classic optimal portfolio models and their variants will be discussed. Practical issues and techniques as well as management issues pertinent to different asset classes will also be discussed.

BAF628 Term Structure of Interest Rates   1.5:0:1.5
This course aims at building in-depth understanding of the term structure models and fixed-income products. Short-rate models, no-arbitrage models, forward-rate models, market models and other popular models are discussed. Theoretical understanding and practical applications are both emphasized.

BAF629 Advanced Derivatives   1.5:0:1.5
This course is designed to provide a deeper understanding of various issues associated with derivatives. It will explore the theoretical and practical implications of various models, trading strategies, and the institutional aspects of these derivatives and the activities of the major participants in them.

BAF630 Analysis of Economic Indicators and Forecasting   1.5:0:1.5
In this course, we learn how easily accessible economic indicators can help you better anticipate turning points in the economy. By studying the best forward-looking economic indicators, decision makers can foresee well in advance shifts in consumer and business spending, interest rates, operating costs, employment trends and foreign economic activity

BAF624 Principles of Insurance and Risk   1.5:0:1.5
This course focuses on issues regarding insurance and principles of risk sharing and transfer; law of large numbers; mutuality principle; risk averseness; insurability; supply and demand in risk management function; role of information in risk sharing and transfer.

BAF631 Estimation of Financial Engineering Models 1.5:0:1.5

This course deals with empirical estimation methods that are frequently used in financial engineering models, and applies the methods to problems in practice. GMM, MLE, EMM, MCMC and nonparametric estimation methods will be covered in the course.

BAF632 Financial Securities and Their Design 1.5:0:1.5

This course will teach how to design financial products using the characteristics of derivative securities in order to satisfy the demand from financial product consumers and the need of financial product suppliers.

BAF633 Simulation Methods for Finance 1.5:0:1.5

Simulation is one of the most widely used methods in finance. This course is designed to teach various simulation methods in a finance framework, and apply the methods to various financial applications.

BAF634 Advanced Econometric Analysis for Finance 1.5:0:1.5

This course is the second course in a two course sequence representing the core of econometric theory. The objective of this course is to familiarize students with advanced topics such as IV estimation, GMM, panel data models, VAR, and qualitative models.

BAF635 Real Estate Investments 1.5:0:1.5

In this course, we seek understand issues in real estate investments. To achieve this goal, we overview the fundamental finance theories of risk-return relationships. Finally, we look at how regulation can affect the market structure and pricing strategy.

BAF636 Interest Rate Derivatives 1.5:0:1.5

This course is designed to provide a understanding of various models associated with the term structure of interest rates and interest rate derivatives. It will explore the theoretical and practical implications of the various term structure of interest rate models, and pricing and hedging of interest rate derivatives.

BAF637 Management of Derivative Position 1.5:0:1.5

This course is designed to study various over-the-counter (OTC) derivatives. Students will learn about the structure, usage, pricing, hedging and portfolio management of OTC derivatives such as knock-in knock-out barrier options, Asian options, and Equity Linked Securities(ELS).

BAF638 Operational Risk Management 1.5:0:1.5

This course will teach the measurement and management of operational risk. The topics in this course are power law, extreme value theory, regulation, 7 categories of operational risk, advanced measurement approach and model risk.

BAF639 Security Analysis and Trading Strategies 1.5:0:1.5

This course is designed to provide the methods of security analyses and asset management. The topics in this course will include the efficient market hypothesis, technical analyses, and fundamental

analyses. Students will have opportunity to do simulated investment games.

BAF640 Financial Market Risk Management   1.5:0:1.5
This course handles the issues associated with market risk management. Hedging methods with various financial products and derivatives are covered. Market risk measurement issues are also discussed under the perspective of enterprise-wide risk management.

BAF641 Numerical Methods in Finance   1.5:0:1.5
This course is designed to introduce numerical methods used to solve mathematical problems in finance. It covers various numerical methods to solve the valuation problem for derivative securities.

BAF642 Financial Time Series Analysis   1.5:0:1.5
This course is designed to provide the framework to analyze and interpret the financial time-series data using time-series models. Topics covered in this course will include the serial correlation analysis, ARIMA models, and Co-integration analysis.

BAF643 Behavioral Finance   1.5:0:1.5
This course introduces the behavioral approach to finance. This course will explore how market participants' behavior influences on the financing and investment behavior of firms and on financial markets.

BAF644 Credit Risk Modeling and Credit Derivatives   1.5:0:1.5
This course introduces the credit risk models and associated risk measurement and management issues. Credit derivatives are also introduced and their pricing methods and hedging techniques are discussed.

BAF645 Derivatives Trading Strategies   1.5:0:1.5
This course is designed to explore the derivative trading strategies based on the knowledge of derivatives. It examines the arbitrage trading strategies between derivatives and their underlying assets as well as between derivatives, hedging strategies related to the investment in the underlying assets or derivatives, and some speculative trading strategies related to derivatives.

BAF646 Statistical Arbitrage   1.5:0:1.5
This course will provide students with the basic concepts and techniques for statistical-based trading. It will present some of the standard approaches to statistical arbitrage including market neutral strategies such a pairs trading, value-based or contrarian methods, momentum-based strategies, cointegration-based trading, algorithmic and high-frequency trading. The course will address how to search for statistical arbitrage strategies based on short term and long-term patterns as well as multi-equity relationships.

BAF516 Computational Finance   3:0:3
Develop the knowledge and ability to develop software in order to handle data efficiently and

accurately applicable to the financial engineering area.

BAF647 Artificial Intelligence and Machine Learning for Financial Engineering   3:0:3
This course is an introductory graduate-level course on artificial intelligence and machine learning. The goal is to provide a general introduction to machine learning, and to understand the important modeling techniques and the associated algorithms used in financial engineering areas.

BAF648 Mathematics for Insurance   1.5:0:1.5
The objective of this course is to present the basic aspects of the theory of insurance and solid foundation for further study in a more general setting, concentrating on the part of this theory related to life insurance.

BAF649 Advanced Financial Time Series Analysis   1.5:0:1.5
This course is designed to provide advance knowledge on the methods of financial time-series analyses. The topics covered in this course will include the state-space models, VAR model, Cointegration test, GARCH, and VECM.

BAF650 Financial Market Microstructure   1.5:0:1.5
This course discusses the market microstructure of financial markets. The topics in this course will include the price-formation process, order structure, market making process, information dissemination process, the role of market participants, information transmission across markets, and the impact of market microstructure on quotes and trades in financial markets.

BAF651 Mortgage Backed Securities & Other Structured Securities   1.5:0:1.5
The course will cover the fundamentals and building blocks of understanding how mortgage-backed securities are priced and analyzed. The focus will be on prepayment and interest rate risks, benefits and risks associated with mortgage-backed structured bonds and mortgage derivatives. Credit risks of various types of mortgages will also be discussed. Next, the course will focus on other structured securities from their basic fundamentals and valuation.

BAF652 Contemporary Topics in Derivatives   1.5:0:1.5
This course deals with several cases in financial engineering and derivatives. Through the case analyses and term project in addition to the lectures, students are expected to develop insight regarding issues in financial engineering and derivatives.

BAF653 Algorithmic Trading and Quantitative Trading   1.5:0:1.5
In this course we develop a quantitative investment and trading framework. In the first part of the course, we study the mechanics of trading in the financial markets, some typical trading strategies, and how to work with and model high frequency data. Then we turn to transaction costs and market impact models, portfolio construction and robust optimization, and optimal betting and execution strategies.In the last part of the course, we focus on simulation techniques, back-testing strategies, and performance measurement. We use advanced econometric tools and model risk mitigation techniques throughout the course.

BAF654 Alternative Investment   1.5:0:1.5

The aim of this course is to introduce the students to the various issues associated with these investment routes including risk return profiles, taxation and legal issues and the advantages and disadvantages of using them

BAF655 Fixed Income Portfolio Management   1.5:0:1.5

This course covers issues pertinent to the management of fixed income portfolios. Characteristics of asset classes of fixed income securities and related products will be discussed. How to construct the optimal portfolios using the above asset classes and how to maintain the portfolio will also be discussed.

BAF656 Commodity Trading   1.5:0:1.5

This course discusses the fundamental nature of the commodity market, associated derivatives, and analytic methods and tools of trading in commodities. Also discussed are specific trading strategies of diverse commodity markets.

BAF611 Investments in Venture   1.5:0:1.5

In this course, we seek understand issues in venture capital investments. To achieve this goal, we overview the fundamental finance theories of risk-return relationships in investing start-up firms. Using the case study approach, we look at each issue including the exit strategies.

BAF657 Introduction to FinTech   1.5:0:1.5

This course will teach new technology trend to make financial systems more efficient. The topics in this course are cloud computing, Internet of Things, payment system, electronic currency and e-TAX.

BAF658 Financial Information and Security Design   1.5:0:1.5

This course will offer the cybersecurities and FinTec technology for financial trading and research services to its customers with several key trading products, including electronic trading, personalized trading and trading connections, FinTech Securities hopes to add an experienced human element to better serve its clients' trading needs.

BAF659 Cross-Sectional Financial Data Analysis   1.5:0:1.5

This course will examine various issues when the cross-sectional financial data are analyzed. The problems of missing data, truncated data, and endogeneity problem will be investigated, and also the problems in panel data analyses will be covered in this course.

BAF660 Financial Data Analysis with Big Data   1.5:0:1.5

This course will introduce HPC(High Performance Computing) provides the foundation for valuable analytics important to financial institutions, embracing: trading (high-frequency and algorithmic); risk management; pricing and valuation of securities and derivatives; and business and economic analytics, including modeling and simulation.

BAF661 Big Data Analysis on Credit Risks   1.5:0:1.5

Credit risk analysis and management are of great interest to investment banks, commercial banks, traders, regulators, and rating agencies. This course provides an introduction as well as an in-depth understanding of credit risk measurements. The objective is to provide a practice-oriented balance

between developing a sound conceptual framework and market understanding and insight.

BAF612 Investments in Private Markets   1.5:0:1.5
In this course, we seek understand issues in venture capital investments. To achieve this goal, we overview the fundamental finance theories of risk-return relationships in investing start-up firms. Finally, we then explore the valuation technique and examine the exiting strategy using the case study approach.

BAF662 Foreign Currency Investment   1.5:0:1.5
This course builds fundamental understanding on foreign currencies and exchange rates, analyzes the foreign currency market and the instruments, and discusses the trading mechanism and trading strategies.

BAF663 Estimation of Asset Pricing Models   1.5:0:1.5
This course is to introduce empirical asset pricing and to focus on the issues of factor pricing models such as expected return-beta representation. Using GMM and cross-sectional regressions, factor pricing models will be estimated.

BAF805 Special Topics in Financial Engineering   1.5:0:1.5
This course deals with the latest developments and comtemporary topics in the field of financial engineering.

BAF811 Distinguished Lectures in Asset Management   1.5:0:1.5
This course focuses on special or current issues regarding asset management.

BAF812 Distinguished Lectures in Financial Engineering   1.5:0:1.5
This course covers methodologies and techniques to analyze important new issues that arise in the field of financial engineering.

BAF687 Cases in Asset Management   1.5:0:1.5
This course deals with several cases in asset management. Through the case analyses and term project in addition to the lectures, students are expected to develop insight regarding issues in risk management.

BAF688 Case Studies on Risk Management   1.5:0:1.5
In this course, cases related to various aspects of risk management at financial institutions are analyzed and discussed. Through the case analyses and term project in addition to the lectures, students are expected to develop insight and problem solving skills in handling risks.

BAF517 Research Methods in Financial Engineering I   1.5:0:1.5
This course covers research methods essential in analyzing financial engineering issues. State-of-the-art numerical and econometric methods as well as research design issues will be discussed.

BAF518Research Methods in Financial Engineering II   1.5:0:1.5

This course discusses research methods essential in analyzing financial engineering issues. As a culminating experience, students are expected work on an issue of choice for dissertation. A preliminary version of the dissertation is to be submitted, presented and evaluated as a term paper.

BAF960 Thesis for Graduate Students   0:0:9

This course is for the research on the thesis.