

M.S. in Quantitative Finance & Risk Analytics (QFRA)

2 - Required Professional Development & Career Workshops

MGMT 7770 Prof. Development Workshop 1/Career Workshops

The PDW sequence is designed to develop the professional skills of students in the MS Programs that are needed to be a successful contributor in a business setting. PDW I follows a framework of Leadership, Followership, and Membership in a professional community. Students will gain practical experience through exposure to experts in specific skill areas, role-play and practice sessions, and exercise completions. The fall semester concentrates on individual skills development in presentation, communication and networking. Additionally, membership in one's professional community will be emphasized through engagement in two activities specific to the student's MS Program. Building on the skills and abilities obtained earlier in your career, this PDW is geared toward a higher level of professionalism inherent in a successful business environment.

MGMT 7780 Prof. Development Workshop 2/Career Workshops

The PDW sequence is designed to develop the professional skills of students in the MS Programs that are needed to be a successful contributor in a business setting. The PDW II will continue to follow a framework of Leadership, Followership and Membership in a professional community. Students will gain practical experience through exposure to experts in specific skill areas, role-play and practice sessions, and exercise completions. The second semester emphasizes developing influence skills, understanding and shaping group dynamics, and navigating organizational politics. Additionally, membership in one's professional community will be emphasized through engagement in four hours of activities specific to the student's M.S. program.

5 Required QFRA Core:

MGMT 6020 Financial Management I

The purpose of this course is to develop a working understanding of the major investment and financial decisions of the firm. Emphasis will be placed upon identifying and solving the problems commonly faced by financial managers. The course presents the needed theory and develops financial problem solving skills through individualized problem solving, structured case analysis, and industry and company analysis using Internet sources.

MGMT 6510 Financial Computation

This course introduces computational techniques for financial analysis, with foci on risk, hedging and portfolio techniques, fixed income instruments, and derivatives analysis. The course covers computational techniques for portfolio optimization, plain vanilla and exotic derivatives valuation and replication, along with interest rate and fixed income instruments. This course will introduce numerical analysis, interpolation, Monte Carlo and finite difference methods, lattices, linear and dynamic programming, optimization and MATLAB, all in a financial computational context.

MGMT 6520 Financial Modeling

This course introduces quantitative analysis for financial markets and instruments. The course covers applications of linear math to hedging and valuation, applications of calculus to valuation and risk analysis, introduces differential equations and their applications to hedging and valuation and introduces stochastic processes in a financial markets context. Course coverage will also extend to portfolio analysis and standard equilibrium asset pricing models.

MGMT 6370 Options Futures & Derivatives Markets

The purpose of this course is to provide an introduction to second generation financial instruments including forward and futures contracts, options, futures options, and swaps on a variety of underlying instruments including fixed income securities. The fixed income markets will be integrated with the discussion of IRDs (interest rate derivatives).

MGMT 6440 Financial Simulation

Knowledge of basics of simulation - random variable generation, statistical analysis of simulation output, and variance reduction methods. Basic understanding of stochastic processes, stochastic calculus and statistical estimation. Introduction to financial markets, financial instruments, and financial asset pricing models. Simulation for valuation of securities, estimation of the "Greeks" and assess risk management strategies. Simulation to assess interest rate dependent claims and credit risk. Simulation to make investment decisions and to measure investment performance.

Select 2 Electives from Business Skills Area:**MGMT 6340 Financial Markets and Institutions**

Focus on financial markets, new instruments and techniques for financing, risk management and its application to financial institutions. Overview of U.S. financial system, the Federal Reserve System, and monetary policy. Emphasis on impact of technology on securities markets and banks. Discussion of current issues in securities markets and banking, such as securitization, financial derivatives, junk bonds, bank failures, mergers and acquisitions, and international banking.

MGMT 6380 Advanced Corporate Finance

The overall objective of this course is to study advanced corporate finance issues and test empirically the stock market reaction to financing decisions and the issuance of securities. Corporate finance topics include shareholder value and economic value added concepts, as well as corporate governance issues. Financing decisions include venture capital and initial public offerings, seasoned equity offerings, stock splits, corporate bonds and bank loans, stock listings on foreign exchanges. Other topics are mergers and acquisitions, pension fund management, financial analysis, and planning. Real stock prices and case studies are used to apply the theoretical concepts.

MGMT 7740 Accounting for Reporting and Control

This course introduces theories and practices of financial as well as managerial accounting. The financial accounting sessions provide an overview of external financial statements. The managerial accounting sessions focus on how accounting information is used in the internal managerial decision making process within a firm as well as cover cost accounting, budgeting, and performance evaluation tools.

MGMT 6240 Financial Trading & Investing

This course introduces interactive trading in financial instruments. Students learn the principles of asset price discovery through real-time trading in a variety of markets, including equities, bonds, options, derivatives. Topics addressed include asset valuation, portfolio management and risk management in the context of real-time trading of financial instruments. The course uses the facilities of the Lally School's Virtual Trading Room. Students will work in teams of two in many trading assignments.

MGMT 6410 Investments

The objectives of this course are: 1) to introduce the student to the most important investment instruments currently traded in U.S. financial markets, including forward and futures contracts, options, futures options and swaps on a variety of underlying instruments including fixed income securities; 2) to discuss the major distributions of modern financial economics in pricing them; 3) to discuss their uses by the investment community in practical investment strategies.

MGMT 6030 Financial Management II

This course, built on Economic and Financial Analysis I, provides a conceptual framework whereby accounting, corporate finance, and investment decisions can be viewed and understood in a unified context of risk and return as it is applicable to all types of businesses and organizations. The course prepares students for future specialized courses in advanced accounting, corporate finance, financial institutions and markets, investment theory, and entrepreneurial finance. The contemporary issues covered in this course include risk and diversification; asset pricing models; capital structure and financing alternatives; dividend and stock repurchases; corporate governance; mergers, acquisitions, and takeovers; financial distress and reorganization; and different international financial topics.

MGMT 6360 International Finance

Course analyzes trends and themes in international financial management, especially how financial management and corporate strategies are carried out in international environments. Topics include foreign exchange markets and risk management, analysis of operating and transaction exposure, international financial markets and banking, international financing and investment. Working capital management and capital budgeting of multinational corporations. Case studies are used.

MGMT 6430 Financial Statement Analysis

This course is designed to strengthen students' ability to correctly analyze, interpret, and evaluate financial statements and their accompanying disclosures. The course is aimed at anyone whose career might involve working with accounting data, and should be especially useful for those interested in consulting and financial analysis. Discussed throughout the semester will be how to use financial accounting information for evaluating past performance and predicting future performance of a company or division. Also discussed will be the key disclosure rules in the United States, the communication methods available to managers, managers' incentives and ability to exert discretion over reported earnings, and the interplay between a company's corporate strategy and its financial reporting policies and practices. The course revolves around a number of topics of recent interest to the business community including accounting and financial analysis, performance forecasting, the quality of earnings, mergers and acquisitions, purchased R&D, post-employment benefits, executive compensation, and intangible assets. This course assumes that students have a basic knowledge of accounting, finance, economics, and business strategy. The focus is on integrating key concepts from each of these areas and applying them to financial decision-making. Half of the course time will be devoted to case analysis. Students are responsible for reading each case thoroughly and familiarizing themselves with the relevant accounting issues before the class.

MGMT 6961 Student Managed Fund

The Roebing Investment Fund, supported by the Lally School at Rensselaer Polytechnic Institute, aims to provide students with real experience in market research, investment management, and overall fund administration to develop their skills for future career endeavors.

MGMT 7760 Risk Management

Overview of risk management and the concept and measurement of risk; types of risks (market, credit, liquidity, operational, business, strategic). Concepts, tools, and instruments available for risk management. Specific issues related with managing specific risk types — market, credit, interest rates, liquidity, risk and operational risk. Securitization, asset-liability management. Concepts underlying insurance and role of insurance for risk management.

Select no more than 1 Elective from Computational Skills Area:

MATP 6600 Nonlinear Programming (also listed as ISYE 6780)

Convex sets and functions, optimality conditions in nonlinear programming, Lagrangian duality, quadratic programming; algorithms for nonlinear programming including Newton's method, quasi-Newton methods, conjugate gradient methods, together with proofs of convergence.

MATP 6610 Computational Optimization

An introduction to nonlinear programming. Models, methods, algorithms, and computer techniques for nonlinear optimization are studied. Students investigate contemporary

optimization methods both by implementing these methods and through experimentation with commercial software. Non-majors wishing to gain practical optimization skills are welcomed in this course. A course project will allow students to explore optimization methods and practical problems directly related to their interests. A computer implementation and a research presentation will be required. Students cannot obtain credit for both this course and MATP 4820.

Select at least 2 Electives from Technical Skills Area:

ECON 6560 Introduction to Econometrics

This course is an introduction to econometric data analysis. The statistical methods covered enable analysis of relationships between variables in data, with special attention to identification of true causal effects. Topics covered include linear and simple nonlinear regression models, internal and external validity, methods for panel data and binary dependent variables, instrumental variables methods, use of experimental and quasi-experimental data, and basic time series methods. The course includes hands-on data analysis and report writing.

MATH 6600 Methods of Applied Mathematics

Linear vector spaces; eigenvalues and eigenvectors in discrete systems; eigenvalues and eigenvectors in continuous systems including Sturm-Liouville theory, orthogonal expansions and Fourier series, Green's functions; elementary theory of nonlinear ODEs including phase plane, stability and bifurcation; calculus of variations. Applications will be drawn from equilibrium and dynamic phenomena in science and engineering.

MATP 4600 Probability Theory & Applications (Fall)

Axioms of probability, joint and conditional probability, random variables, probability density and distribution functions, expectation, functions of random variables, and limit theorems. Applications of probability to models in operations research, including queuing theory and Markov chains.

MGMT 6400 Financial Econometrics Modeling (Spring)

This course addresses financial modeling as an empirical activity. Several key issues and assumptions of finance are addressed through empirical modeling. Topics may include asset pricing, event studies, exchange rate movements, term structure of interest rates, and international linkages among financial markets. Computers are used extensively both in and out of class.

MGMT 6964 Fixed Income Securities

This course develops the concepts and tools that will provide a deep understanding of the forces driving the valuation, risk and return of fixed income securities. Fixed income securities were once associated with securities having deterministic streams of "fixed" income payments, such as coupons on US Treasury debt. However, nowadays most

fixed income instruments have income streams that are, in fact, random and which depend on the level of interest rates and/or the health of the underlying assets or the economy. The study of the world of fixed-income securities now includes such instruments as floaters, inverse floaters, forwards, futures, options, caps/floors, interest rate swaps, credit default swaps, collateralized debt obligations, mortgage-backed securities and treasury inflation protected securities. The size and importance of these markets makes the pricing, hedging and overall risk management of fixed-income securities and their derivatives invaluable to traders, risk managers, regulators or anyone interested in the functioning of the modern financial system. The course will introduce students to a set of analytical tools and real-world examples to highlight the valuation, the risks and the management of fixed income securities. After taking the course, you will be empowered with the most important tools necessary to tackle the proper analysis of a wide class of fixed income securities, assess their risk and to value them.

ISYE 6010 Applied Regression Analysis

Emphasis is on empirical model building and evaluation for both multiple linear and nonlinear regression models. Topics specifically addressed are simultaneous estimation, diagnostics and remedial measures, selection procedures, locally weighted least squares classification variables, binary response variables, time series data, nonlinear estimation, software packages.

MATP 4620 Mathematical Statistics

A course in the theory of statistics that will provide students with a basic foundation for more specialized statistical methodology courses. Topics include sampling and sampling distributions; point estimation including method of moments, maximum likelihood estimation, uniform minimum variance estimation, and properties of the associated estimators; hypothesis testing including uniformly most powerful, likelihood ratio, chi-square goodness-of-fit tests, and tests for independence. The course concludes with an introduction to linear statistical models.