

Department of Finance and Quantitative Methods

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The Department of Finance and Quantitative Methods serves actuarial science, finance, risk management and insurance majors, decision analysis minors, and others enrolled for one of the actuarial science, finance, quantitative methods, or risk management and insurance courses. Solid foundations in the fundamentals of these fields and the supporting areas of mathematics, communications, and the sciences, both natural and social, are stressed by departmental faculty. Graduates are equipped to adapt to rapidly changing and competitive environments. Innovation, creativity, and analysis are integrated into a diverse and rigorous program preparing students for graduate school or success in their chosen professional fields.

Social and professional activities available to students include the Actuarial Science Club, the Bradley Investment Organization, and the Financial Management Association and its National Honor Society.

Actuarial Science – Business Actuarial Science – Business Major

A career in actuarial science is widely recognized as one of the most attractive professions available to college graduates. Actuaries apply a unique set of business and mathematical skills in solving financial and social problems. Examples of organizations employing actuaries include insurance companies, public utilities, and select regulatory agencies.

The actuarial science major is a cooperative effort between the risk management and insurance program and the department of mathematics and is based on the premise that successful actuaries have mastered essential business and risk management and insurance knowledge along with specific actuarial mathematics skills.

The objective of Bradley's actuarial science program is to prepare majors for successful careers as actuaries. Required courses include several which help students prepare for several of the standard actuarial exams administered by the Society of Actuaries (SOA) and the Casualty Actuarial Society (CAS). Bradley is one of fewer than 30 schools in the United States to offer a risk management and insurance undergraduate major as well as an actuarial science major that prepares students to complete several exams.

A list of the program requirements is provided below, along with a recommended course sequence for actuarial science-business (ASB) majors.

Departmental requirements for an actuarial science – business major

- Complete the business core, substituting MTH 325 and 326 for QM 262 and 263, respectively; and substituting IME 313 for BMA 353.
- Actuarial Science Business (ASB) requirements:
 - All students must successfully complete the following courses:
 - CS 104 Computers and Programming with FORTRAN
or
 - CS 106 Introduction to Programming and Computer Science
 - MTH 121 Unified Calculus I
 - MTH 122 Unified Calculus II
 - MTH 223 Unified Calculus III
 - MTH 207 Elementary Linear Algebra with Applications
 - MTH 325 Probability and Statistics I
 - MTH 326 Probability and Statistics II
 - MTH 335 Topics in Actuarial Science
 - MTH 427 Applied Statistical Methods
 - MTH 510 Numerical Methods I
 - IME 313 Operations Research I
 - RMI 315 RMI Issues and Practice
 - All students must successfully complete one additional 3-credit-hour RMI course.
- All students are encouraged to take at least one of the following courses: ECO 301 Money and Banking, FIN 325 Investment Analysis, or FIN 425 Portfolio Theory and Management.
- All students must complete at least one professional actuarial exam administered by the Society of Actuaries.

A recommended course sequence for actuarial science–business majors is shown below. Elective courses should be chosen with care to ensure that the University general education requirements are satisfied.

Freshman Year

ATG 157 Accounting Principles – Financial.....	3
ATG 158 Accounting Principles – Managerial.....	3
BUS 100 Contemporary Business	3
COM 103 The Oral Communication Process	3
ENG 101 English Composition	3
MTH 121 Calculus I	4
MTH 122 Calculus II	4
General Education Requirements.....	8
BMA 172 / Competency Exam	1
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Sophomore Year

BUS 210 Team Dynamics	1
CS 104 Computers and Programming with FORTRAN or CS 106 Introduction to Programming and Computer Science	3
ECO 221 Principles of Microeconomics	3
ECO 222 Principles of Macroeconomics	3
MTH 223 Calculus III	4
MTH 207 Elementary Linear Algebra with Applications....	3
MTH 325 Probability and Statistics I.....	3
General Education Requirements.....	8
Behavioral Science Requirements.....	3
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Junior Year

BMA 342 Legal Environment of Business.....	3
BMA 352 Managing in Organizations.....	3
BUS 220 Career Planning Strategies	1
RMI 315 RMI Issues and Practice.....	3
FIN 322 Business Finance.....	3
IB 306 Introduction to International Business.....	2
IME 313 Operations Research I	3
MTH 326 Probability and Statistics II.....	3
MTH 335 Topics in Actuarial Science	3
General Education Requirements.....	3
Another 3-semester-hour RMI course.....	3

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Senior Year

ECO 300-level.....	3
ENG 300, 301, 304, 305, or 306	3
MTH 427 Applied Statistical Methods	3
MTH 510 Numerical Methods I.....	3
MTG 315 Principles of Marketing.....	3
BMA 372 Information Technology	3
BMA 452 Strategic Management and Business Policy	4
Behavioral Science Requirements.....	3
Free Electives.....	6

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Finance Major

Finance is the art and science of managing money and claims against money. The study of finance involves an analytic treatment of decision-making under conditions of risk and uncertainty. Graduates of this program are prepared to enter the dynamic and challenging world of finance or to continue their education in graduate school. MBA and MS in finance programs and law schools attract many graduates. The finance major enables students to understand the problems of obtaining and using monetary resources. Students select options preparing them for work in corporate finance, the securities area, futures, forward markets, options markets, real estate, insurance, or personal financial planning. International Financial Management and Financial Institutions and Markets courses are sometimes offered off campus in locations such as London and New York City.

Corporate

Students interested in corporate finance select courses providing a background in the various financial elements of corporate activities. Typically, financial management decisions involve capital budgeting and financing decisions as well as the daily activities associated with allocating and obtaining funds. A variety of optimization and modelling techniques are studied. The ability to develop a sound financial analysis of an opportunity is emphasized.

Securities

Students interested in the securities area select courses that will develop their skills in analyzing and selecting investment opportunities. Portfolio analysis as well as identification of individual security characteristics are stressed. The markets for securities of all types, domestic and international, are studied to provide an understanding of their opportunities and constraints. Implications of market efficiency are considered. The ability to develop a worthwhile and unique analysis of

investments is emphasized.

Markets and Institutions

Students interested in financial institutions such as insurance companies, banks, pension funds, and finance companies select courses that will prepare them for positions in these organizations. Modern technology, globalization and newer ideas associated with managing financial institutions are of particular importance. The decision-making ability needed for proper management of progressive organizations is developed through a variety of rigorous courses.

Other

The curriculum structure is suitable for students planning graduate study or entrepreneurial activities. Many past students now own and operate their own businesses.

Due to the highly quantitative nature of many areas of finance, the entering student is advised to have a strong mathematics background. Three years of algebra, one year of geometry, and a semester of trigonometry are recommended. It is also helpful for entering students to have and be able to use a personal computer.

Departmental requirements for a finance major:

- A. A total of 21 hours in finance courses in addition to Finance 322, Business Finance.
- B. FIN 494, Financial Strategy, plus a minimum of 3 additional hours in finance courses at the senior (4xx) level. These classes count as part of the required 21 hours in finance.
- C. Three hours from courses designated as "tools courses," selected from:
 - Q M 326 Business Forecasting
 - Q M 364 Decision Support Systems
 - ATG 204 Cost Accounting
 - ECO 319 Introduction To Econometrics
 - ECO 418 Mathematical Economics
 - RMI 365 Risk Analysis
- D. An approved three-hour functional area international course, selected from:
 - FIN 323 International Financial Management
 - ATG 361 International Accounting
 - ECO 390 International Monetary Economics
 - ECO 391 International Trade

Note: FIN 323 also counts as part of the required 21 hours in finance.
ECO 390 and 391 also count as the junior-senior level economics course required by the college.
- E. QM 260 Quantitative Methods in Finance
- F. Three hours in a computer programming language, selected from:
 - CIS 102 Introduction to Computer Information Systems with BASIC
 - CS 104 Computers and Programming with FORTRAN
 - CS 106 Introduction to Programming and Computer Science

An illustrative course sequence follows. Elective courses should be chosen with care to ensure that the University general education and Foster College of Business Administration requirements are met.

Freshman Year

BUS 100 Contemporary Business	3
ENG 101 English Composition	3
MTH 115 or 121 Calculus I	4
QM 260 Quantitative Methods in Finance	3
ATG 157 Accounting Principles - Financial	3
COM 103 The Oral Communication Process	3
Programming Language (Section F)	3
General Education and/or Behavioral Science	8
BMA 172 / Competency Exam	1
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Sophomore Year

ATG 158 Accounting Principles	3
BUS 210 Team Dynamics	1
ECO 221 Principles of Microeconomics	3
ECO 222 Principles of Macroeconomics	3
QM 262 Quantitative Analysis I	3
QM 263 Quantitative Analysis II	3
General Education, Behavioral Science, Finance Elective (FIN 220) and/or Tools Course (Section C, ATG 204)	16
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Junior Year

ENG 300, 301, 304, 305, or 306 Advanced Writing	3
FIN 322 Business Finance	3
MTG 315 Principles of Marketing	3
IB 306 Introduction to International Business	2
BMA 342 Legal Environment of Business	3
BMA 352 Managing in Organizations	3
BMA 372 Information Technology	3
BUS 220 Career Planning Strategies	1
Finance Electives (Consider Section D, FIN 323)	6
Tools Course (Section C), Finance Elective, General Education and/or Free Electives	3
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Senior Year

BMA 353 Operations Management	3
ECO Junior-Senior Elective (Consider Section D, ECO 390 or 391)	3
Finance Electives (Consider Section D, FIN 323)	6
Senior Finance Elective	3
FIN 494 Financial Strategy	3
BMA 452 Strategic Management and Business Policy	4
International Requirement (Section D) or Free Elective	3
General Education, Finance Elective, and/or Free Electives	6
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Risk Management and Insurance

Risk Management and Insurance Major

Every organization faces a myriad of risks. The well-being of organizations, employees and their families, competitors, customers, and the general public can depend on how such risks are handled. Using organizational resources to identify, evaluate, and treat risks efficiently and effectively is the challenge of risk management.

Risk management is about the assessment, control, and financing of risks. Insurance is an important and commonly used risk financing technique which allows the insured to transfer at least some of the responsibility for paying for losses to another party, such as a private insurance company or a government risk pool. A thorough understanding of risk management is essential to the effective management of any for-profit or not-for-profit entity.

The risk management and insurance (RMI) program aims to prepare creative and highly motivated students to assume positions of responsibility and leadership in the risk management and insurance fields. The undergraduate RMI major is an interdisciplinary, 24-credit-hour program which strives to cultivate the analytical, decision-making, ethics, team work, written, and oral communications skills needed by successful entrants into business and governmental risk management. Other career opportunities available to risk management and insurance graduates include actuarial science; employee benefits management and consulting; insurer financial, marketing, or personnel management; agency operations; broking; claims adjusting; underwriting; and global risk management and insurance. Alternatively, majors may pursue graduate degrees in the fields of law, business, or RMI, for example.

Departmental requirements for an RMI major

1. Required RMI foundation courses (15 credit hours)
Students must successfully complete the following courses:
RMI 315 Risk Management and Insurance
Issues and Practice
FIN 322 Business Finance
RMI 365 Risk Analysis
RMI 415 Risk Control and Financing
RMI 465 Advanced Studies in Risk Management
and Insurance
2. An approved 3-credit-hour international economics or finance course.
Students must successfully complete one of the following courses:
FIN/IB 323 International Financial Management
ECO/IB 390 International Monetary Economics
ECO/IB 391 International Trade

Note: ECO 390 and 391 also count as the junior/senior level economics course required by the Foster College of Business Administration.
3. Six credit hours in an approved supporting area.
Students will select focus areas in cooperation with their advisor. The focus area must consist of 6 credit hours, be consistent with and supportive of the student's career objectives, and be approved by a Risk Management and Insurance faculty member.

Examples of focus areas include actuarial science, entrepreneurship, financial institutions, human resource management, investments, and marketing. Other focus areas may be acceptable.

A recommended course sequence for risk management and insurance majors is shown below. Elective courses should be chosen with care to ensure that the University general education requirements are satisfied.

Freshman Year

ATG 157 Accounting Principles-Financial	3
BUS 100 Contemporary Business	3
COM 103 The Oral Communication Process	3
ENG 101 English Composition	3
MTH 115 Calculus ¹	4
General Education and/or Behavioral Science	15
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Sophomore Year

ATG 158 Accounting Principles-Managerial	3
BUS 210 Team Dynamics	1
ECO 221 Principles of Macroeconomics	3
ECO 222 Principles of Macroeconomics	3
QM 262 Quantitative Analysis I.....	3
QM 263 Quantitative Analysis II.....	3
General Education, Behavioral Science, and/or Free Electives.....	15
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Junior Year

BMA 342 Legal Environment of Business.....	3
BMA 352 Managing in Organizations.....	3
BUS 220 Career Planning Strategies	1
ENG 300, 301, 304, 305 or 306 Advanced Writing	3
RMI 315 Risk Management and Insurance Issues and Practice	3
FIN 322 Business Finance.....	3
RMI 365 Risk Analysis	3
IB 306 Introduction to International Business.....	2
MTG 315 Principles of Marketing	3
Focus Area Course.....	3
General Education, Focus Area, and/or Free Electives.....	4
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Senior Year

BMA 353 Operations Management	3
BMA 372 Information Technology	3
BMA 452 Strategic Management and Business Policy	4
Economics junior/senior elective	3
RMI 415 Risk Control and Financing	3
RMI 465 Adv. Studies in Risk Management and Insurance.....	3
General Education, focus area, ECO 390, 391, or FIN 323 and/or free electives	12
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¹Students pursuing a focus area in actuarial science should take MTH 121 instead of MTH 115. Students pursuing actuarial studies should also take MTH 122 Calculus II, MTH 223 Calculus III, and MTH 325 Probability and Statistics I before graduating.

Decision Analysis Minor

The minor in Decision Analysis is designed to provide students with a solid foundation of mathematical and quantitative tools essential to sound decision-making. All areas of academic study such as sociology, psychology, and health sciences, may benefit from the application of analytical thought. Thus, this program will assist students in all majors across campus in formulating optimal solutions to common problems they will encounter in their professional lives. Students enrolled in the Decision Analysis program will acquire the skills to critically evaluate alternative solutions to complex questions in an analytical and pragmatic manner. Upon graduation these students will find themselves better prepared to assume responsible positions of authority and to perform their professional duties in a resourceful and productive manner.

In addition to the University requirements and those imposed by the student's college, a minor in Decision Analysis must complete the following or their equivalents:

Required:

Q M 262 - Quantitative Analysis I (3 hours)
Q M 263 - Quantitative Analysis II (3 hours)

Nine (9) hours from Groups A and B with at least six (6) from Group A:

Group A:

Q M 326 - Business Forecasting (3 hours)
Q M 364 - Decision Support Systems (3 hours)
Q M 369 - Topics in Quantitative Methods (3 hours)

Group B:

ECO 319 - Introduction to Econometrics (3 hours)
ECO 418 - Mathematical Economics (3 hours)
Q M 498 - Independent Study in Quantitative Methods (1 - 3 hours) or a quantitative methods course in the student's major if approved by the FQM Department

Students whose major is from the Foster College of Business Administration must have at least 12 hours in courses that are unique from those used to fulfill their major requirements. Students should consult their academic advisor.

Course Descriptions

Finance

FIN 220 Personal Finance

3 hrs. (Gen. Ed. SF)

Principles and practice of management of personal income, wealth, and credit; budgeting, sources of financing, savings, estate planning, and institutions of personal finance.

FIN 322 Business Finance

3 hrs.

Capital budgeting and principles of financial management. External and internal sources of funds: costs and profitable uses in business organizations.

Prerequisites: ATG 157 and junior/senior standing.

FIN 323 International Financial Management**3 hrs.**

Financial characteristics of international business. International exchange, liquidity, markets, investments, and banking, in context of historical development, environmental characteristics, economic factors, political systems, and legal constraints. Emphasis on exchange rate exposure management. Cross listed as IB 323.

Prerequisites: ATG 158; ECO 222; junior/senior standing.

FIN 325 Investment Analysis**3 hrs.**

Principles of investment analysis. Introduction to security valuation using fundamental analysis with associated trading rules. Introduction to technical analysis/charting with trading rules. Functions and descriptions of securities markets and trading. Prerequisites: FIN 322, QM 262.

FIN 327 Derivative Securities**3 hrs.**

Overview of options, futures, swaps, and related financial securities. Examination of exchanges, pricing issues, arbitrage, and trading strategies. Applications emphasize the use of derivative securities for managing financial risk. Prerequisites: FIN 322, QM 260.

FIN 328 Financial Institutions and Markets**3 hrs.**

Operation of financial institutions and interrelationships between their operations and economic activity; credit flow and money movements, in the context of financial institutions' operations. Structure and organization of the financial system; emphasis on markets and intermediaries. Prerequisites: ECO 100 or ECO 221; ECO 222; junior standing.

FIN 384 Entrepreneurial Finance**3 hrs.**

Planning and strategies involved in starting or expanding a business. Emphasis on capitalization, record keeping, liquidity management, fixed asset management, financial analysis, expansion strategies, establishing firm value, and exiting the firm. Cross-listed with BMA 384.

Prerequisites: BMA 352; FIN 322.

FIN 421 Liquidity Management**3 hrs.**

Managing firms' liquidity position; emphasis on use of positive and normative models dealing with short term assets and liabilities; ensuring liquidity while enhancing firm value. Prerequisite: FIN 322, QM 263.

FIN 422 Financial Analysis**3 hrs.**

Interpretation and analysis of corporate financial statements. Current annual and interim reports as a source of data for management, stockholders, and creditors. Prerequisite: FIN 322, QM 263.

FIN 423 Advanced Business Finance**3 hrs.**

Complex problems of the corporate finance manager. Emphasis on modern finance tools in managerial decision making. Recent literature of corporate finance. Prerequisite: FIN 322, QM 263.

FIN 424 Capital Budgeting**3 hrs.**

Long-term capital investment decisions and long-term financing. Strategic wealth creation, general valuation principles, evaluation of net present value rule, alternative capital budgeting methods, ranking projects, taxation, marginal cash flows, and the impact of inflation. Single-investment risk analysis, risk analysis for top management and fully diversified investors, cost of capital, capital structure, dividend policy, interactions between investment and financing decisions, leasing, and capital rationing. Prerequisite: FIN 322, QM 263.

FIN 425 Portfolio Theory & Management**3 hrs.**

Introduction to portfolio theory. Diversification concepts. Market-oriented capital asset pricing model, options pricing model, and arbitrage pricing theory. Market efficiency. Relationship of portfolio theory to fundamental and technical analyses. Portfolio management and evaluation techniques. Prerequisites: FIN 325; QM 260; QM 263.

FIN 426 Financial Research and Modeling**3 hrs.**

Modeling financial processes, cash flows, security prices, etc., for decision making. Econometric, distribution-based, Markov and Stochastic Process concepts are employed. Treats risk/uncertainty identification, measurement and management. Prerequisites: QM 260; QM 263; FIN 322, and one additional jr./sr. finance course.

FIN 429 Topics in Finance**3 hrs.**

Topics of special interest which may vary each time course is offered. Topic and prerequisite stated in current Schedule of Classes. May be repeated under different topics for a maximum of nine hours credit.

FIN 494 Financial Strategy**3 hrs.**

Contemporary review of theory and practice of financial risk management. Principles for managing financial risk are applied to interest rates, exchange rates, and commodity prices. Financial engineering is incorporated into unified ethical and sustainable managerial problem solving and policy decisions designed to achieve successful operations. Supporting financial elements areas are integrated to understand and appreciate their interdependencies and benefits as a culminating academic experience. Prerequisites: 12 hours of finance at 300 or 400 level.

FIN 498 Independent Study in Finance**1-3 hrs.**

Studies undertaken by academically qualified students under guidance of a faculty member. Open to Finance and Quantitative Methods Department majors only. May be repeated under different topics for a maximum of six hours credit. Prerequisites: junior/senior standing; 2.5 of cumulative grade point average; consent of Department Chair.

Quantitative Methods

Q M 260 Quantitative Methods in Finance

3 hrs.

Introduction to mathematics of finance. Emphasis is placed on the applications of mathematical techniques to important financial concepts such as capital budgeting, measures of risk and return, investments, and market efficiency. Techniques of optimization as applied to diversification and portfolio management. Prerequisite: MTH 115 or MTH 121.

QM 262 Quantitative Analysis I

3 hrs.

Data presentation and computation of descriptive measures. Probability theory, probability distributions, expectations, variance, covariance, and correlation coefficient. Sampling, central limit theorem, statistical estimation, one or two sample tests of hypotheses. Prerequisite: MTH 109 or equivalent.

QM 263 Quantitative Analysis II

3 hrs.

Linear and multiple regression, correlation, analysis of variance, contingency tables, time series, decision theory, and non-parametric methods. Data analysis using statistical computer packages. Prerequisites: QM 262; MTH 115 or 121.

QM 326 Business Forecasting

3 hrs.

Develops basic principles and techniques of forecasting through integration of scientific and judgmental forecasting in financial applications. Objective analysis of historical data is combined with subjective insight to demonstrate how data for budgets can be developed, profits maximized, and risks reduced. Emphasis on use of forecasting by individual firms. Prerequisites: QM 263 and junior/senior standing.

QM 364 Decision Support Systems

3 hrs.

Deterministic and probabilistic models of management science and use of computer-based support for the decision making process. Models such as linear and integer programming, transportation and assignment problems, CPM/PERT, simulation and queueing models. Applications in a variety of business areas using the computer. Prerequisites: BMA 172 or equivalent; QM 262; junior/senior standing.

QM 369 Topics in Quantitative Methods

3 hrs.

Topics of special interest which may vary each time course is offered. Topic stated in current Schedule of Classes. May be repeated under different topics for a maximum of six hours. Prerequisite: junior/senior standing.

QM 498 Independent Study in Quantitative Methods

1-3 hrs.

Studies undertaken by academically qualified students under guidance of a faculty member. Open to Finance and Quantitative Methods Department majors only. May be repeated under different topics for a maximum of six hours. Prerequisites: junior/senior standing; 2.5 cumulative grade point average; consent of Department Chair.

Risk Management and Insurance

RMI 315 Risk Management and Insurance Issues and Practice

3 hrs.

The fundamental aspects of risk management and insurance (RMI). Emphasis on understanding the nature of risk assessment, control, and financing activities for organization. RMI policy issues impacting the firm (e.g., discrimination, health care and financing, environmentalism). Cross-listed as BMA 315. Prerequisite: junior standing.

RMI 365 Risk Analysis

3 hrs.

The nature and importance of risk analysis; qualitative and quantitative risk analysis data; user-friendly approaches to constructing statistical estimates for risk; loss analysis; using risk and loss estimates in decision making and related public policy issues (e.g., fair versus unfair risk factors). Prerequisites: RMI 315; QM 262.

RMI 415 Risk Control and Financing

3 hrs.

The nature and importance of risk financing; integrating cost of risk with accounting, tax, financial, economic, and psychological information; risk control and financing methods ranging from conventional to innovative; role of financial engineering; impact of risk financing decisions on accounting and financial statements; risk financing implementation. Prerequisites: RMI 315; FIN 322.

RMI 465 Advanced Studies in Risk Management

3 hrs.

Small teams examine various risk management scenarios and make appropriate recommendations. Students conduct a risk management review for a local small business and make appropriate recommendations. Emphasis on enhancing written and oral communication skills. Prerequisites: RMI 315; RMI 365 or 415.

RMI 492 Independent Study or Research in RMI

1-3 hrs.

Studies or research undertaken by academically qualified students under the guidance of a faculty member. May be repeated for a maximum of 6 semester hours. Prerequisites: RMI or ASB major and consent of RMI program director.