ACTUARIAL SCIENCE

Program Overview

The Actuarial Science program is designed to provide students with the knowledge, skills and tools they will need to obtain employment as an actuary. The program incorporates a blend of business and liberal arts courses in mathematics to provide a deep understanding of critical thinking, analysis, and communication skills as well as project management and teamwork.

Employment projections predict a high demand for actuarial science positions over the next several years. Students interested in actuarial science will find this program contains all the components that contribute to a successful actuarial career and an excellent track record of placement upon graduation.

Student Learning Outcomes

Students graduating from the Actuarial Science program will be:

1. prepared to take the Society of Actuaries (SOA) exams required for employment in the actuarial science profession.
2. able to demonstrate the proficiency in the three Validation by Educational Experience (VEE) requirements by SOA.
3. able to write technical reports and make technical presentations containing statistical and actuarial results.
4. able to apply statistical methods using relevant software to solve real-world problems.
5. prepared to continue their study in finance, mathematics, statistics, and other related fields and take additional SOA exams to advance their career.

Degree Offered

- B.S. in Actuarial Science

Contact

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Program Website: Actuarial Science (http://www.rider.edu/academics/colleges-schools/college-liberal-arts-education-sciences/science-programs/actuarial-science/)

Actuarial Science B.S. Major Requirements

(60 credits)

Code	Title	Credits
Required Mathematics Courses		
MTH 210	Calculus I [1]	4
MTH 211	Calculus II [1]	4
MTH 212	Calculus III	4
MTH 240	Linear Algebra	3
MTH 250	Differential Equations	3
MTH 308	Advanced Calculus	3
MTH 340	Probability & Statistical Analysis I	3
MTH 341	Probability & Statistical Analysis II	3
Two MTH Electives (at 300 level or above)		6
Required Accounting Courses		
ACC 210	Introduction to Accounting	3
ACC 220	Managerial Uses of Accounting	3
Required Finance Courses		
FIN 220	Introduction to Finance	3
FIN 309	Intermediate Corporate Finance	3
Required Economics Courses		
ECO 200	Principles of Macroeconomics	3
ECO 201	Principles of Microeconomics	3
Required Management Science Courses		
MSD 330	Predictive Modeling and Applications	3
MSD 350	Financial Mathematics	3
Required Computer Science Course		
Select one of the following courses:		3
CSC 105	Fundamentals of Computer Science	
CSC 110	Computer Science I	
Total Credits		**60**

Code	Title	Credits
Recommended Free Electives [2]		
FIN 307	Financial Markets & Institutions	
FIN 308	International Finance	
FIN 312	Investments	
FIN 340	Risk Management	
FIN 360	Fixed Income and Derivatives	
HTH 336	Economics of Health Care System	

[1] Students must receive a grade of "B" or above in Calculus I (MTH 210) and Calculus II (MTH 211).

[2] Recommended free electives are not required for completion of the major.

Academic Plan of Study

The following educational plan is provided as a sample only. Rider students who do not declare a major during their freshman year; who are in a Continuing Education Program; who change their major; or who transfer to Rider may follow a different plan to ensure a timely graduation. Each student, with guidance from their academic advisor, will develop a personalized educational plan.

Course	Title	Credits
Year 1		
Fall Semester		
MTH 210	Calculus I [1,3]	4
ECO 200	Principles of Macroeconomics	3
CMP 120	Seminar in Writing and Rhetoric	3
HIS 150	Pre-Modern World: Evolution to Revolution	3
Foreign Language [1]		3
	Semester Credit Hours	**16**

Spring Semester		
MTH 211	Calculus II	4
ECO 201	Principles of Microeconomics	3
HIS 151 or HIS 152 or HIS 153	World in the Modern Era: Exploration to Globalization or Contemporary World: Historical Perspectives or Cold War: A Global History	3
CMP 125	Seminar in Writing and Research	3
Foreign Language		3
	Semester Credit Hours	**16**
Year 2		
Fall Semester		
MTH 240	Linear Algebra	3
ACC 210	Introduction to Accounting	3
CSC 105 or CSC 110	Fundamentals of Computer Science or Computer Science I	3
COM 104	Speech Communication	3
Social Perspectives		3
	Semester Credit Hours	**15**
Spring Semester		
MTH 212	Calculus III	4
FIN 220	Introduction to Finance	3
ACC 220	Managerial Uses of Accounting	3
Social Perspectives		3
Scientific Perspectives		3
	Semester Credit Hours	**16**
Year 3		
Fall Semester		
MTH 308	Advanced Calculus	3
MTH 340	Probability & Statistical Analysis I	3
FIN 309	Intermediate Corporate Finance	3
Philosophical Perspectives		3
Free Elective [2]		3
	Semester Credit Hours	**15**
Spring Semester		
MTH 341	Probability & Statistical Analysis II	3
Scientific Perspectives		3
Free Electives [2]		9
	Semester Credit Hours	**15**
Year 4		
Fall Semester		
MTH Elective		3
MSD 350	Financial Mathematics	3
Aesthetic Perspectives: Literature		3
Free Electives [2]		3
	Semester Credit Hours	**12**
Spring Semester		
MTH 250	Differential Equations [4]	3
MSD 330	Predictive Modeling and Applications	3
Math Elective		3
Aesthetic Perspectives: Fine Arts		3
Free Electives [2]		3
	Semester Credit Hours	**15**
	Total Credit Hours for Graduation	**120**

1. For course placement information see https://www.rider.edu/student-life/first-year-experience/orientation/placement-testing (https://www.rider.edu/student-life/first-year-experience/orientation/placement-testing/)
2. Please note that elective credits may be used to complete requirements in a second major or minor.
3. Mathematics General Education Curriculum requirements are included in the major.
4. MTH 250 - Differential Equations will be offered in the spring of even years. MTH 308 - Advanced Calculus will be offered in the fall of odd years. Please consult with your academic advisor for the timing of these courses.

Courses and Descriptions

ACC 210 Introduction to Accounting 3 Credits
This course provides an introduction to basic principles and methods of accounting essential to preparation, understanding and interpretation of financial statements. Topics include accounting for merchandising concerns, current assets, long-term assets, liabilities and equity accounts. A brief overview of internal control is also covered.

ACC 220 Managerial Uses of Accounting 3 Credits
This course provides an introduction to the use of accounting information in managerial decision-making. Topics include cost behavior, cost classifications, and problem-solving functions of accounting as they pertain to planning, control, evaluation of performance, special decisions, and budgeting. The interpretation of published financial statements and the statement of cash flow are also covered.
Prerequisite(s): ACC 210.

CSC 105 Fundamentals of Computer Science 3 Credits
This course offers an introduction to fundamental areas of study in computer science - their applications, capabilities, and boundaries. Topics include computer organization, algorithms design and analysis, programming paradigms, software development process, operating systems responsibilities, applications, and communications. Hands-on python programming is also introduced in this course from a non-mathematical problem-solving point of view. Basic programming constructs include statements, expressions, variables, control structures, functions, and file operation.

CSC 110 Computer Science I 3 Credits
This course is an introduction to computer science and modern computing fundamentals. Students will develop programs and algorithms to solve a variety of problems posed in the natural sciences. Students will learn to code in Python, a widely adopted language, and learn the basics of algorithms, data types, program structure and development.

ECO 200 Principles of Macroeconomics 3 Credits
A collective view of income receiving and spending sectors of the national economy, including households, businesses, and governments. Issues discussed: What determines the level of output, income, and employment achieved by the economy? What determines the growth of national output and employment? National income accounting, income and employment theory, monetary system, general price level, business cycle, government policies designed to provide for full employment, price stability, and economic growth are also covered.
Prerequisite(s): Place into MSD 105 based on SAT or ACT Score, OR place into MSD 105/MTH 102 by passing College Placement, OR passing MSD 104, OR having transferred in any college level MSD or MTH class.

ECO 201 Principles of Microeconomics 3 Credits
Market price systems are analyzed. The nature and characteristics of consumer and producer behavior, the theory of pricing in competitive and noncompetitive markets, and determination of the distribution of output a re evaluated. Welfare, social control, monopoly, and income inequality a re explored in the light of price theory. The role of the United States in the world economy is explored.
Prerequisite(s): Place into MSD 105 based on SAT or ACT Score, OR place into MSD 105/MTH 102 by passing College Placement, OR passing MSD 104, OR having transferred in any college level MSD or MTH class.

FIN 220 Introduction to Finance 3 Credits
An introduction to the environment, concepts, and techniques of financial management. Topics include forms of business organization, taxes, analysis of financial performance, financial planning, financial markets and interest rates, time value of money, bond and stock valuation, risk and return, capital budgeting, cost of capital, and international financial management.
Prerequisite(s): ACC 210 and ECO 201.

FIN 307 Financial Markets & Institutions 3 Credits
This course provides an introduction to the organization and behavior of financial markets and institutions in the economy. The factors determining security prices and interest rates in the money and capital markets are analyzed. An overview of all major financial institutions is presented. In addition, market returns, the regulatory environment, and monetary policy are examined.
Prerequisite(s): FIN 220.

FIN 308 International Finance 3 Credits
Financial management in the international environment. Topics include balance of payments, foreign exchange markets, arbitrage, hedging of currency risk, country risk management, and the evaluation of foreign investment opportunities.
Prerequisite(s): FIN 220.

FIN 309 Intermediate Corporate Finance 3 Credits
This course builds on and extends the concepts of financial management learned in FIN 220. The course examines long-term corporate financing and investment decisions and how those decisions interface with each other. Topics covered include: cost of capital, financial planning and analysis, capital budgeting, capital structure and dividend policy.
Prerequisite(s): FIN 220.

FIN 312 Investments 3 Credits
The fundamentals of investing in stocks, bonds, and other negotiable instruments are covered. Major topics include trading on securities markets, mutual funds, international investing, margin accounts, short sales, determinants of securities prices, and investment risks. Stock options, financial futures, convertible securities, and implications of taxes on investment decisions are also discussed.
Prerequisite(s): FIN 220.

FIN 340 Risk Management 3 Credits
This course examines the risk management process as applied to the firm as a whole. It integrates the management of all risks facing the firm: strategic, financial, hazard, and operational. Techniques for identifying risk, measuring and analyzing it, and selecting an appropriate treatment will be explored.
Prerequisite(s): FIN 220.

FIN 360 Fixed Income and Derivatives 3 Credits
This course centers on the quantitative portion of the Chartered Financial Analyst (CFA) level 1 curriculum, which includes materials on fixed-income risk and return, fundamentals of risk analysis, derivative instruments and risk management applications of option strategies. The goal is to help students prepare for the exam, as well as introduce them to a variety topocs in finance.
Prerequisite(s): FIN 312.

HTH 336 Economics of Health Care System 3 Credits
This course presents ways in which economic analysis can be used to explain issues in the health care industry. Microeconomics tools will be used to describe the behavior of consumers, producers, and third parties of the health care sector. The course also investigates the role of government in regulating the health care sector, and in providing services to the poor and elderly. Finally, we will use this foundation to examine some recent changes in this industry, and to analyze the most recent proposals for further changes.

MSD 330 Predictive Modeling and Applications 3 Credits
This course covers a broad range of predictive models in the areas of parametric and non-parametric statistical methods. Examples include time series models and data mining. It focuses on building theoretical foundations underlying these methods and their applications to empirical data such as forecasting time series and classifications. Students are expected to acquire advanced predictive modeling skills and be comfortable with using statistics software R after taking this course. This is a required course for Actuarial Science students in preparation for the Society of Actuaries' "Statistics for Risk Modeling" exam, and an elective course for Business Data Analytics major and minor students who are interested in deepening their skills in predictive analytics.
Prerequisite(s): MSD 205 or MTH 341.

MSD 350 Financial Mathematics 3 Credits
A thorough treatment of the theory and applications of compound interest. Topics include the measurement of interest, elementary and general annuities, amortization schedules and sinking funds, and bonds and other securities.
Prerequisite(s): MSD 205 or equivalent.

MTH 210 Calculus I 4 Credits
Introduces analytic geometry, functions, limits, and derivatives; differentiation of algebraic and trigonometric functions, curve sketching, maxima and minima, and higher derivatives.
Prerequisite(s): Math SAT 650 or higher or Math ACT score of 28 or higher or MTH 105 or MTH 106 with a grade of C or higher.

MTH 211 Calculus II 4 Credits
The definite integral, differentiation of transcendental functions, methods of integration and approximate integration, determination of area, volume, and surface area.
Prerequisite(s): MTH 210 with a grade of C or higher.

MTH 212 Calculus III 4 Credits
Infinite series; functions of two and three variables, vectors and tangent planes, partial derivatives, multiple integrals, determination of volume and density.
Prerequisite(s): MTH 211 with a grade of C or higher.

MTH 240 Linear Algebra 3 Credits
Systems of linear equations; vector spaces; linear independence; determinants; orthogonality; linear maps; eigenvectors.
Prerequisite(s): MTH 210 or as corequisite; sophomore standing; or permission of instructor.

MTH 250 Differential Equations 3 Credits
First order differential equations, separable and exact; integrating factors; second order linear differential equations; series solutions of second order linear differential equations; higher order equations; existence and uniqueness theorems; systems of linear differential equations.
Prerequisite(s): MTH 240, MTH 211.
Corequisite(s): MTH 212 or as prerequisite.

MTH 308 Advanced Calculus 3 Credits
Vectors, gradients, and directional derivatives, Lagrange multipliers, Taylor's theorem, multiple integrals, change of variables, line and surface integrals, Stokes' theorem.
Prerequisite(s): "B" average in MTH 210 and MTH 211; MTH 212, MTH 240.

MTH 315 Modern Geometry 3 Credits
Covers geometry from a modern point of view, with emphasis on non-Euclidean geometry, particularly projective geometry.
Prerequisite(s): MTH 211, MTH 240.

MTH 340 Probability & Statistical Analysis I 3 Credits
Theory of sets and probability; discrete and continuous random variables and probability distributions. Emphasizes foundations and utilizes the techniques of the calculus.
Prerequisite(s): MTH 212 or MSD 111.

MTH 341 Probability & Statistical Analysis II 3 Credits
Continuation of MTH 340. Foundations of mathematical statistics: normal distributions, estimation, confidence intervals and hypothesis testing; topics chosen from student's t- test, chi-square tests, analysis of variance and regression analysis. Emphasizes foundations and utilizes the techniques of the calculus.
Prerequisite: MTH 340. Spring.

MTH 401 Modern Algebra 3 Credits
Provides an introduction to modern abstract algebra. It emphasizes the axiomatic method to analyze the major algebraic systems. The instructor will choose the topics to be studied from among the following algebraic structures: integral domains, fields, complete ordered fields, groups, polynomials, rings, ideals and modules.
Prerequisite(s): MTH 240.

MTH 402 Topics in Advanced Mathematics 3 Credits
Chosen from advanced pure or applied mathematics. Topics vary, depending on instructor.
Prerequisite(s): MTH 212 and MTH 240.

MTH 410 Complex Analysis 3 Credits
Analytic functions, conformal mapping, power series, Cauchy's theorem, calculus of residues.
Prerequisite(s): MTH 212 and MTH 240.

MTH 420 Number Theory 3 Credits
Covers topics including divisibility theory, the prime numbers, the theories of congruences and of quadratic reciprocity, and Fermat's Last Theorem. Other topics may also include applications to cryptography, Pell's equations, continued fractions, and the theory of partitions.
Prerequisite(s): MTH 240 or permission of instructor.

MTH 430 Introduction to Topology 3 Credits
A comprehensive introduction to elementary topology. The concepts of topological spaces and metric spaces will be introduced. Connectedness, compactness and properties of subsets of the real numbers rooted in topology will also be considered. The quotient topology will be used to construct surfaces as identification spaces, and tools will be developed to distinguish one surface from another.
Prerequisite(s): MTH 212.

MTH 440 Real Analysis 3 Credits
Covers the theory of sets, the real number system and its properties, convergence of sequences and series of numbers and functions, and the theory of integration, including: measure theory, the Riemann integral, and introduction to the Lebesque theory of integration.
Prerequisite(s): MTH 212 and MTH 240.

MTH 490 Independent Study: Research and Creative Expression 1-4 Credits
Immerses the student in research and mathematical literature. If possible, the student will publish the results or present them at a scientific meeting. Available to majors/minors only. Approval of the faculty sponsor, department chair, and CAS dean's office is required. Only one project may be scheduled in a semester and up to 12 semester hours of independent study may count toward graduation.
Prerequisite(s): A minimum of 45 credits and 3.0 GPA.