UConn Actuarial Science Course Descriptions

MATH 2620 - Financial Mathematics I (3 credits)

This is a foundational course in the mathematics of actuarial science. The goal for students is to master the fundamental concepts of financial mathematics as regularly used by actuaries. Topics covered include: time value of money, interest/discount rates, present/future value calculations, annuity valuation, loan amortization mechanics, bond valuation, term structure of interest rates. Though not an exam prep course, this course covers much of the material tested on SOA Exam FM/CAS Exam 2. However, test questions are generally not FM exam level.

MATH 3550 – Programming for Actuaries (3 credits)

In your career as an actuary, you will not only need business, actuarial, and soft skills, but you will need strong technical skills. In this course, you will be introduced to a base set of tools used regularly in actuarial work: Introductory Excel, VBA, SQL, and R. Lectures paired with actuarial-based case studies and group projects help to solidify these concepts and show you how they are used in the real world today.

MATH 3610 – Probability Problems (1 credit)

This course expands on topics covered in MATH 3160 (Probability) with an insurance/actuarial focus to prepare students for the SOA Exam P/CAS Exam 1. Classes provide a review of probability concepts learned in 3160 but are primarily focused on working practice problems consistent with those found on exam P. Though a 1-credit course, 3610 should be treated like a 3-credit course and requires the effort of a 3-credit course (class time is equivalent and passing exams is a top priority for actuarial science students).

MATH 3615 – Financial Mathematics Problems (1 credit)

This course reviews and expands on topics covered in MATH 2620 and adds coverage of Asset/Liability Management topics (matching, duration, convexity, etc.) to prepare students for the SOA Exam FM/CAS Exam 2. Classes focus on solving problems consistent with those found on exam FM. solving, with lectures to reinforce important concepts and show how actuaries can apply those concepts to simple problems in insurance and risk management. Though a 1-credit course, 3615 should be treated like a 3-credit course and requires the effort of a 3-credit course (class time is equivalent and passing exams is a top priority for actuarial science students).

MATH 3620 – Foundations of Actuarial Science (3 credits)

This course introduces students to the actuarial profession, starting with a basic definition of risk and exploring how actuaries apply the concepts of financial mathematics and probability to the risks in traditional (insurance, pensions) and non-traditional (enterprise risk management) areas of practice. Topics covered include pricing, reserving, reinsurance, regulation (including capital requirements and ORSA), insurer operations, insurance contracts, employee benefits and social insurance systems. Students will also learn how actuarial work is used by others and how this creates a professional responsibility for actuaries. This is not an exam prep course but will help students prepare for advanced actuarial courses and for the SOA Actuarial Science Foundations modules.

MATH 3630 – Long Term Actuarial Mathematics I (4 credits)

This course builds on concepts learned in Math 2610/3615 (financial mathematics) and Math 3160/3610 (probability) and adds mortality/survivorship concepts to teach mathematical foundations of life contingencies and their applications to quantifying risks in actuarial contexts (focused on life insurance and annuities). Topics covered include: survival/longevity models, mortality tables, premium and reserve calculations in the context of various life insurance and annuity product designs. The course covers a portion of the material tested on the long-term section of SOA Exam FAM.

MATH 3631 – Long term Actuarial Mathematics II (3 credits)

A continuation of MATH 3630, this course covers roughly 85% of the topics on SOA Exam ALTAM. Topics include: Multi-State Models, Joint Life Insurance, Pensions, Profit Sharing and Universal Life Insurance.

MATH 3636 – Advanced Statistical Modeling I (3 credits)

In addition to established actuarial methods, predictive analytics will play more and more of a role in your everyday work as an actuary. Paired with MATH 3637, these courses will introduce you to typical predictive analytics methods used in actuarial analysis today and going forward. For this course, we focus on univariate methods: you will be reminded of simple linear regression and will be introduced to multiple linear regression, splines, ridge regression, the lasso model, other regression techniques, and a handful of time series models. Lectures paired with actuarial-based case studies and group projects help to solidify these concepts and show you how they are used in the real world today. This course helps the student prepare for SOA exam SRM and CAS exams MAS I & II.

MATH 3637 – Advanced Statistical Modeling II (3 credits)

A continuation of MATH 3636, this course focuses on multivariate methods supporting predictive analytics used in actuarial analysis: you will be introduced to unsupervised learning techniques (such as K-means clustering and hierarchical clustering), generalized linear models, and tree-based methods (such as CART, random forest, and gradient boosting machines). Lectures paired with actuarial-based case studies and group projects help to solidify these concepts and show you how they are used in the real world today. This course helps students prepare for SOA exam SRM and CAS exams MAS I & II.

MATH 3639 – Actuarial Loss Models (3 credits)

This course introduces the student to actuarial loss models, which are mathematical and statistical tools needed for actuaries to estimate and predict insurance losses or claims in the future. These models play a crucial role in actuarial pricing, reserving, risk management, and financial planning. Technical aspects of the course include topics such as claim frequency and severity, aggregate loss models, coverage modifications, risk measures, and construction, estimation, and evaluation of various parametric models. This course helps the student prepare for the short-term section of SOA exam FAM, SOA exam ASTAM, and CAS exam 5.

MATH 3640 – Short-term Insurance Ratemaking (3 credits)

This course provides an introduction to actuarial methods used in the pricing of insurance products, with an emphasis on property & casualty products. You will be introduced to the actuarial indication process, with all its premium, expense, and loss adjustments, as well as risk classification analysis. We will extensively cover the actuarial ratemaking process, including an understanding of how business partners, industry, and third-party data help to provide insights into assumptions and decision-making. Lectures, paired with real-life examples and group projects, help to solidify these concepts and show you how they are used in the real world today. This course helps the student prepare for the short-term section of SOA exam FAM, SOA exam ASTAM, and CAS exam 5.

MATH 3641 – Short-term Insurance Reserving (3 credits)

This course provides an introduction to actuarial methods used in setting reserves, with an emphasis on property & casualty products. You will be introduced to the actuarial reserve review process, particularly focusing on actuarial methods (such as the Development Method, Expected Claims technique, Bornhuetter-Ferguson Method, Cape Cod Method, Frequency-Severity techniques, and more). We will discuss how business partners, industry, and third-party data help to provide insights into assumptions and decision-making. Lectures paired with real-life examples and group projects help to solidify these concepts and show you how they are used in the real world today. This course helps the student prepare for the short-term section of SOA exam FAM, SOA exam ASTAM, and CAS exam 5.

MATH 3650 – Financial Mathematics II (3 credits)

The primary goal of this course is to provide a deep understanding of the theory and practice of corporate finance. You will learn how corporations decide which business opportunities to pursue, how to determine capital needs and how capital is raised. This course covers: Financial Statement Analysis: balance sheet, income statement & cash flow statement; Arbitrage & Financial Decision Making; Term Structure of Interest Rates; Defining & Measuring Risk; Investment Decision Rules: net present value vs. internal rate of return; Fundamentals of Capital Budgeting; Valuing Stocks & Bonds; Structure & Role of Capital Markets; Modern Portfolio Theory: efficient portfolios, capital asset pricing model & cost of capital; Efficient Markets; Capital Structure: equity vs. debt financing; Financial Distress, Management Incentives & Information; Payout Policy; Financial Planning. The course includes an individual project to help solidify some of these concepts. It provides VEE credit for Finance (with a grade of B- or better).

MATH 3660 – Advanced Financial Mathematics (3 credits)

This course applies the concepts of financial mathematics (MATH 2620/3615) and probability (MATH 3160/3610) to the valuation of uncertain cash flows in financial markets. The course exploresing the characteristics and uses of derivatives including forwards, futures, options and swap contracts. Topics include binomial and Black-Scholes valuation, option Greeks, immunization, hedging and risk management. This is not an exam prep course but does cover the option pricing topics tested on the SOA Exam FAM.

MATH 3670W – Technical Writing for Actuaries (3 credits)

A writing and communications course for future actuaries supporting future career success. Topics covered in the course vary slightly from year to year but often include topics such as: career communications (resume, cover letter, Linked In), e-mails, elevator pitch, presentation skills, data visualization, current topics in actuarial science, professionalism and ethics, among others. Homework will include some combination of weekly assignments and larger research-based assignments.