

MATH 4827 Actuarial Mathematics II (3,3,0)

Prerequisite: MATH 2805 Mathematics of Compound Interest and Math 3837 Actuarial Mathematics

Actuarial reserves: allocation of the loss to the policy years. Multiple life functions: joint-life, last-survivor. Multiple decrement models: stochastic and deterministic approaches, associated single decrement, fractional durations. Valuation theory for pension plans. Insurance models including expenses: gross premiums and reserves, type of expenses, modified reserves. Non-forfeiture benefits and dividends: equity concept, cash values insurance options, asset shares, dividends.

MATH 4835 Property and Casualty Insurance (3,3,0)

Prerequisite: MATH 2805 Mathematics of Compound Interest and Math 3837 Actuarial Mathematics

Ratemaking: terminology, process, trend, ultimate losses, expense provisions, profit and contingencies, overall rate indications, classification rates, increased limits. Individual risk rating: prospective systems, retrospective rating, design. Loss Reserving: accounting concepts, definitions, principles, loss reserving process. Risk classification: relationship to other mechanisms, criteria for selecting rating variables, examples, efficiency, estimating class relativities.

MATH 4836 Theory of Pension (3,3,0)

Prerequisite: MATH 2805 Mathematics of Compound Interest and Math 3837 Actuarial Mathematics

Overview of pension plans: design, funding, regulation, accounting standards. Pension funding methods: actuarial cost methods, terminal funding method. Individual actuarial cost methods: accrual benefit cost method, entry-age actuarial cost method, unit-credit method, individual-level-premium method, attained-age-normal method. Group actuarial cost methods.

MATH 4837 Risk and Portfolio Management (3,3,0)

Prerequisite: MATH 2205 Multivariate Calculus and MATH 2206 Probability and Statistics

This course introduces the fundamental concepts of financial derivatives and portfolio risk measurement and management. Students will learn why both firms and individual investors should learn how to measure and manage risk. The first part of the course overviews on some common financial derivative instruments and their natures, how they can be used for investment and hedging purposes, and how they can be priced. The second part of the course gives the students an insight into how a business can identify the risk components, measure its loss exposures and select appropriate tools for the management risks. We shall detail the types of risks that firms are exposed to, and the costs and benefits associated with risk management. We examine the popular Value-at-Risk (VAR) and Expected Shortfall (ES) framework to help us estimate the risk exposure of firms. The third part of the course discusses about the portfolio measurement, management and portfolio performance evaluation. To highlight the practical relevance of the course materials we shall discuss a number of real-word case studies throughout the course.

MATH 4865 Special Topics in Operations Research I (3,3,0)**MATH 4866 Special Topics in Operations Research II (3,3,0)****MATH 4867 Special Topics in Operations Research III (3,3,0)**

This course is devoted to the study of up-to-date and important topics in different areas of Operations Research. Emphasis is laid on the continuation and consolidation of those fundamental courses offered in the programme. It is specifically designed with the flexibility to take advantage of visiting scholars from other institutions to introduce topics that are under current research.

MATH 4875 Special Topics in Statistics I (3,3,0)**MATH 4876 Special Topics in Statistics II (3,3,0)****MATH 4877 Special Topics in Statistics III (3,3,0)**

This course is devoted to the study of up-to-date and important

topics in different areas of Statistics. Emphasis is laid on the continuation and consolidation of those fundamental applied courses offered in the programme. It is specifically designed with the flexibility to take advantage of visiting scholars from other institutions to introduce topics that are under current research.

MATH 4998 Mathematical Science Project I (3,0,9)

Prerequisite: Year IV Standing

This is a half-year individual project which usually relates to an interdisciplinary or applied topic, and requires knowledge and skill acquired in various courses. A thesis and an oral presentation are required upon completion of the project.

MATH 4999 Mathematical Science Project II (3,0,9)

Prerequisite: MATH 4998 Mathematical Science Project I, and Recommendation by the supervisor

This is an extension of MATH 4408 for outstanding students, who are now supposed to conduct more innovative further developments for their results obtained in MATH 4408. A thesis and an oral presentation for Project I are waived but will be required upon completion of Project II.

MATH 7030 Numerical Linear Algebra (3,3,0)

This course covers the advanced topics in numerical linear algebra. Theoretical issues as well as practical computer applications will be addressed.

MATH 7050 Optimization Theory and Techniques (3,3,0)

This course introduces the fundamental theory and techniques for both unconstrained and constrained optimization. Overview of the existing numerical software packages will be addressed. Finally some interdisciplinary techniques and applications related to optimization will be discussed.

MATH 7140 Special Topics in Applied Mathematics I (3,3,0)

This course is devoted to the study of up-to-date and important topics in different areas of applied mathematics. Emphasis is laid on the continuation and consolidation of those fundamental courses offered in the programme. It is specifically designed with the flexibility to take advantage of visiting scholars from other institutions to introduce topics that are under current research.

MATH 7150 Special Topics in Applied Mathematics II (3,3,0)

This course is devoted to the study of up-to-date and important topics in different areas of applied mathematics. Emphasis is laid on the continuation and consolidation of those fundamental courses offered in the programme. It is specifically designed with the flexibility to take advantage of visiting scholars from other institutions to introduce topics that are under current research.

MATH 7160 Special Topics in Applied Mathematics III (3,3,0)

This course is devoted to the study of up-to-date and important topics in different areas of applied mathematics. Emphasis is laid on the continuation and consolidation of those fundamental courses offered in the programme. It is specifically designed with the flexibility to take advantage of visiting scholars from other institutions to introduce topics that are under current research.

MATH 7170 Interior Point Methods for Optimization (3,3,0)

This course aims to introduce students to the fundamental topics in the interior point based methods for optimization, both the discrete and continuous versions of the interior point methods will be taught. Students will learn theory, techniques and solution schemes of the interior point based methods for linear programming, quadratic programming, convex programming, and semidefinite programming problems. Some MATLAB implementation will be also addressed.