

MATH 4270 Actuarial Mathematics II

Course description: Multiple life functions; multiple decrement models; valuation theory for pension plans; insurance models including expenses, nonforfeiture benefits and dividends.

Schedule: Spring, 3 credit hours

Prerequisite: C or better in MATH 4260 (Actuarial Mathematics I)

Textbook: Models for Quantifying Risk by Robin Cunningham, Thomas Herzog and Richard London, Actex (2005).

General information: Life contingencies are introduced in MATH 4260, and MATH 4270 continues with coverage of additional topics tested on SOA/CAS Exam M/3, as well as some topics relevant to SOA/CAS Exam C/4. The textbook exercises will be supplemented with sample questions from actuarial examinations.

Calculators: An approved calculator for the SOA/CAS examinations, TI-30Xa or TI-30X II, is recommended.

Topics covered:

Chapter 11 Funding Plans for Contingent Contracts

- 11.1-11.4 Review
- 11.5 Funding Plans Incorporating Expenses
- 11.6 Miscellaneous Examples

Chapter 12 Contingent Contract Reserves

- 12.1-12.4 Review
- 12.5 Incorporation of Expenses
- 12.6 Reserves at Fractional Durations
- 12.7 Generalization to Non-Level Benefits and Premiums
- 12.8 Miscellaneous Examples

Chapter 13 Models Dependent on Multiple Survivals

- 13.1 The Joint-Life Model
- 13.2 The Last-Survivor Model
- 13.3 Contingent Probability Functions
- 13.4 Contingent Contracts Involving Multi-Life Statuses
- 13.5 General Random Variable Analysis
- 13.6 Common Shock – A Model for Lifetime Dependency

Chapter 15 Multiple Contingencies with Applications

- 15.1 Discrete Multiple-Decrement Models

- 15.2 Theory of Competing Risks
- 15.3 Continuous Multiple-Decrement Models
- 15.4 Uniform Distribution of Decrements
- 15.5 Multi-State Models
- 15.6 Actuarial Present Value
- 15.7 Asset Shares

Chapter 16 Models for Aggregate Payments

- 16.1 Individual Risk versus Collective Risk
- 16.2 Selection of Frequency and Severity Distributions
- 16.3 More on the Collective Risk Model
- 16.4 Infinitely Divisible Distributions