



UNIVERSITY OF  
CALGARY

FACULTY OF  
SCIENCE

Department of Mathematics and  
Statistics

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Actuarial Science 327

Life Contingencies I

(see Course Descriptions for the applicable academic year: <http://www.ucalgary.ca/pubs/calendar/>)

**Main reference Text:** "Actuarial mathematics for life contingent risk (Second edition)",  
by David C.M. Dickson, Mary R. Hardy and Howard R. Waters

## *Syllabus*

### **Topics**

Chapter 1: Introduction to life insurance

Chapter 2: Survival models

Chapter 3: Life tables and selection

Chapter 4: Insurance benefits

Chapter 5: Annuities

Chapter 6: Premium calculation

Time permitting, additional material from elsewhere in the text may be introduced at the instructor's discretion. Instructor may draw materials for assigned topics from an alternative text which uses the notation given in the main reference text.

It is intended that this course should cover an approximately one third of the syllabus for the Society of Actuaries Exam LTAM – Long-Term Actuarial Mathematics. This course syllabus should be updated as needed, with this objective in mind.

## Course Outcomes

### ACSC 327: Life Contingencies I

By the end of this course, students will be able to:

1. Calculate and interpret standard probability functions including survival and mortality probabilities, force of mortality, and complete and curtate expectation of life. Compute higher-order moments and percentiles associated to the future lifetime and the curtate future lifetime random variables.
2. Compute and interpret standard probability functions based on general life tables. Use fractional age assumptions to compute these quantities for all ages and durations. Construct and interpret survival models for cohorts consisting of non-homogeneous populations, for example, smokers and non-smokers or ultimate-and-select groups.
3. Derive formulae for the valuation of traditional insurance benefits. Compute and interpret probabilities, means, percentiles and higher-order moments associated to the random variables representing the present values of these benefits.
4. Derive formulae for the valuation of life contingent annuities. Compute and interpret probabilities, means, percentiles and higher-order moments associated to the random variables representing the present values of these annuities.
5. Compute net and gross premiums for insurance policies and annuities using various premium principles. Calculate and interpret probabilities, means, percentiles and higher-order moments of random variables associated with these premiums, including loss-at-issue random variables.

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