



Students requiring accommodations as a result of disability must contact the Centre for Students with Disabilities 778-782-3112 or csdo@sfu.ca

Instructor: Barbara Sanders

Prerequisite:

STAT 285, and ACMA 210 (with a grade of C+ or higher)

Required Text:

Actuarial Mathematics for Life Contingent Risks, 2nd ed. by Dickson, Hardy & Waters.; Publisher: Cambridge University Press

References:

- *Models for Quantifying Risk* by R. Cunningham, T. Herzog, R. London, Publisher: ACTEX
- *ACTEX Study Manual for Exam M of the SOA* by Matt Hassett, Donald G. Stewart, Amy Steeby, publisher: ACTEX.
- *Life Contingencies* by C.W. Jordan; publisher: SOA.
- *Life Insurance Mathematics* by H.U. Gerber; publisher: Springer-Verlag.
- *The Mathematics of Life Insurance* by Menge and Fisher; publisher: Ulrich's.

Calendar Description:

Survival distributions: age at death, life tables, fractional ages, mortality laws, select and ultimate life tables. Life insurance: actuarial present value function (apv), moments of apv, basic life insurance contracts, portfolio. Life annuities: actuarial accumulation function, moments of apv, basic life annuities. Net annual premiums: actuarial equivalence principle, loss function, accumulation type benefits. Actuarial reserves: prospective loss function, basic contracts, recursive equations, fractional durations. Covers part of the syllabus for Exam M of the Society of Actuaries, and Exam 3 of the Casualty Actuarial Society, and covers practical applications such as computational aspects of pricing and reserving, and risk measurement of insurance portfolios. **Quantitative.**

Outline:

This course covers the fundamentals of Actuarial Mathematics in life insurance. The topics covered correspond to about the first half of the syllabus of Exam MLC of the Society of Actuaries and they include the following:

1. Survival Models: Future lifetime; actuarial functions; fundamental theorems for calculating moments of actuarial functions; analytical laws of mortality.
2. Life Tables and Selection: Life tables; stochastic and deterministic approaches to life table functions; assumptions for fractional ages; select and ultimate survival models; mortality projection
3. Net Single Premiums for Life Insurance Contracts: Definition using a stochastic approach; distribution of the actuarial present value function for different insurance contracts.
4. Life Annuities: Actuarial accumulation function; aggregate payment and current payment techniques; life annuities with monthly payments - UDD; recursive equations.
5. Net Annual Premiums: Actuarial equivalence principle; basic contracts; monthly premiums; life insurance with accumulation type benefits.
6. Reserves: Definition of prospective loss; basic contracts; monthly premium reserves: recursive equations for discrete reserves, reserves at fractional durations, allocation of the loss to policy years.

Grading Scheme:

Assignments – 10%

2 Midterms – 25% each

Final – 40%

The grading is subject to change.

Students should be aware that they have certain rights to confidentiality concerning the return of course papers and the posting of marks. Please pay careful attention to the options discussed in class at the beginning of the semester. Students are reminded that Academic Honesty is a cornerstone of the acquisition of knowledge. Scholarly integrity is required of all members of the University. Students are encouraged to review policies pertaining to academic integrity available on Student Services webpage at <http://students.sfu.ca/academicintegrity.html>

Revised October 11, 2013