



ACMA 320-3E ACTUARIAL MATHEMATICS I

Spring 2003
EVENING COURSE

Instructor: AVINASH MANIRAM

Prerequisites:

ACMA 310 (with a grade of C+ or higher), MATH 232 and STAT 280 must precede or be taken concurrently.

Textbook:

Actuarial Mathematics (2nd ed) by Bowers, Gerber, et al.; Publishers: Society of Actuaries

References:

- *ACTEX Study Manual for course 150 examination of the SOA* by G. Crofts, M.A. Gauger, D. London; publishers: ACTEX.
 - *Life Contingencies* by C.W. Jordan; publishers: SOA.
 - *Life Insurance Mathematics* by H.U. Gerber; publishers: Springer-Verlag.
 - *The Mathematics of Life Insurance* by Menge and Fisher; publishers: Ulrich's.
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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. This course covers part of the syllabus of course 3 of the Society of Actuaries.

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 course 3 of the Society of Actuaries and they include the following:

1. Survival Distributions: Future lifetime, life tables; fundamental theorems for calculating moments of actuarial functions; other actuarial functions; 3 assumptions for fractional ages; analytical laws of mortality.
2. Net Single Premiums for Life Insurance Contracts: Definition using a stochastic approach; distribution of the actuarial present value function for different insurance contracts.
3. Life Annuities: Actuarial accumulation function; aggregate payment and current payment techniques; life annuities with monthly payments- UDD, complete annuities (immediate), apportionable annuities (due); recursive equations.
4. Net Annual Premiums: Actuarial equivalence principle; basic contracts; monthly premiums; life insurance with accumulation type benefits.

5. Reserves: Definition of prospective loss; basic contracts; and monthly premiums reserves: recursive equations for discrete reserves, reserves at fractional durations, allocation of the loss to the policy years.

Grading:

Homework - 10%

Midterm I - 20%

Midterm II - 20%

Final - 50%

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.

Revised October 2002