ACSC 3720/STAT 3720 Life Contingencies I

The course is open to anyone who has successfully completed STAT 2600, and STAT 3360.

Calendar description:

This course introduces the student to the mathematical models for valuation of life contingencies (e.g. life insurance policies). The course covers both the statistical aspects of modelling survival data, and the financial aspects of valuing uncertain future cash-flows.

Course description:

It is intended that this course should cover a portion of the syllabus for that part of the professional actuarial examination concerned with Life Contingencies. Currently, this corresponds to most of the material listed from Chapters 1–7, which is on the syllabus for the Society of Actuaries Exam MLC Models for Life Contingencies. This course syllabus should be updated as needed, with this objective in mind.

Evaluation:

6–8 assignments (15%), midterm (30%), closed-book final exam (55%)

Textbook

Actuarial Mathematics for Life Contingent Risks, 2nd Edition 2013, D. C. M. Dickson, M. R. Hardy and H. R. Waters.; Publisher: Cambridge University Press

Another possibly useful reference (not required) is

Models for Quantifying Risk, 5th Edition 2012, R. Cunningham, T. N. Herzog, and R. L. London; Publisher: Actex

Topics

This course covers the fundamentals of life contingencies. The topics covered correspond to chapters 1–7 of the required text and the study notes from SOA for Exam MLC. They include the following:

1. Survival models — Future lifetime random variable, force of mortality, mean and standard deviation of T_x, curtate future lifetime.

2. Life tables and Selection — Life tables, Fractional age assumptions, national life tables, Survival models for life insurance policyholders, life insurance underwriting, select and ultimate survival models.

3. Insurance Benefits — valuation of insurance benefits, relating $\overline{A}_x$, A_x and $A_x^{(m)}$, variable insurance benefits, functions for select lives,

4. Annuities — life annuities, comparison of annuities by payment frequency, deferred annuities, guaranteed annuities, increasing annuities, evaluating annuity functions

5. Premium calculation — the present value of the future loss random variable, equivalence principle, Gross premium calculation, Profit, portfolio percentile premium principle, extra risks

6. Policy values — policies with annual cash flows, cash flows at discrete intervals, continuous cash flows, policy alterations, retrospective policy value, negative policy values.