ACSC/STAT 3720, Life Contingencies I
Winter 2017
Toby Kenney

Instructor:	Toby Kenney
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Course Website:	`www.mathstat.dal.ca/~tkenney/3720/2017/`
Office Hours:	Tuesday 9:00-10:00, Wednesday 10:30-11:30 & Thursday 9:00-10:00
Lectures:	MWF: 11:35-12:25 Chase 319
Topics:	Survival Models, Life Tables and Selection, Insurance Benefits, Annuities, Premium Calculation, Policy Values
Textbook:	"Actuarial Mathematics for Life Contingent Risks" (2nd Ed.)
	by David C. M. Dickson, Mary R. Hardy, and Howard R. Waters
	published by Cambridge University Press, 2013

Course Work and method of assessment

There will be a midterm exam and a final exam. The midterm will be held in class on Friday 3rd March, and should cover the material in Chapters 1–5. The content of this exam may be changed, depending on the progress in lectures. The final exam will be scheduled by the Registrar's Office during the examination period: Wednesday 12th to Wednesday 26th April.

There will also be (approximately) weekly homework assignments, which must be handed on Fridays in the lecture. After this, I will put the model solutions on the course website. **No credit can be given for late homework.** The overall homework mark will be made up of an average of the weekly homework marks, with the exception of the worst mark for each student.

The homework sheet will be divided into 2 sections: The *basic questions* section tests the basic concepts covered in the course: everyone should be able to do all these questions. The *standard questions* section has questions where the concepts covered in the course can be applied to more realistic situations, or questions which involve a stronger theoretical insight; these questions are mostly straightforward, though there may be the occasional tricky question included. There may also be some *bonus questions* which are either more challenging, or else raise interesting or important issues that are not central to this course.

Grades will be determined by performance in the exams and the weekly homeworks. The midterm exam counts for 30%, the final counts for 55%, while the homework counts for the remaining 15%. You must pass the final exam to obtain a passing grade in the course.

Weekly Readings

Since class time is limited, I will be using it for explaining concepts and going over examples, rather than reading through the textbook. You should therefore read through the relevant sections of the textbook *before* the lecture, in order to gain the full benefit from the lecture. The sections of the textbook that will be covered each lecture will be listed on the website. This list may be updated from time to time, depending on the progress made in earlier lectures. Here is the current plan.

Week beginning	Monday	Wednesday	Friday
9th January	Introduction and Preliminaries	**1 Introduction to Life Insurance**	**2 Survival Models:** 2.2 The future lifetime random variable, 2.3 Force of mortality
16th January	2.4 Actuarial notation ,2.5 Mean and standard deviation of T_x, 2.6 Curtate future lifetime	**3 Lifetables and Selection:**, 3.2 Life tables, 3.3 Fractional age assumptions, 3.4 National life tables, 3.5 Survival models for life insurance policyholders	3.5 Survival models for life insurance policyholders (cont.), 3.6 Life insurance underwriting, 3.7 Select and ultimate survival models, 3.8 Notation and formulae for select survival models
23rd January	3.9 Select life tables, 3.10 Heterogeneity in mortality, 3.11 Mortality trends	**4 Insurance Benefits:** 4.2 Introduction, 4.3 Assumptions, 4.4 Valuation of insurance benefits: 4.4.1–4.4.3 Whole life insurance, 4.4.4 Recursions	4.4.5 Term insurance, 4.4.6 Pure Endowment, 4.4.7 Endowment Insurance, 4.4.8 Deferred Insurance Benefits
30th January	4.5 Relating different cases of whole life insurance, 4.6 Variable insurance benefits, 4.7 Functions for select lives	**5 Annuities:** 5.2 Introduction, 5.3 Review of annuities certain, 5.4 Annual life insurance	MONROE DAY
6th February	5.4 Annual life insurance (cont.), 5.5 Annuities payable continuously, 5.6 Annuities payable $\frac{1}{m}$thly	5.7 Comparison of annuities by payment frequency, 5.8 Deferred annuities, 5.9 Guaranteed annuities	5.10 Increasing annuities, 5.11 Evaluating annuity functions
13th February	5.12 Numerical illustrations, 5.13 Functions for select lives	Revision chapters 1–5	Revision chapters 1–5
20th February	STUDY WEEK		
27th February	Revision chapters 1–5	Revision chapters 1–5	MIDTERM EXAM
6th March	**6 Premium Calculation:** 6.1 Summary, 6.2 Preliminaries, 6.3 Assumptions, 6.4 The present value of the future loss random variable	6.5 The equivalence principle	6.6 Gross premiums
13th March	6.7 Profit	6.8 The portfolio percentile premium principle	6.8 The portfolio percentile premium principle (cont.)
20th March	6.9 Extra risks	**7 Policy Values:** 7.1 Summary, 7.2 Assumptions, 7.3 Policies with annual cash flows: 7.3.1 The future loss random variable 7.3.2 Policy values for policies with annual cash flows, 7.3.3 Recursive formulae for policy values	7.3.4 Annual profit by source, 7.3.5 Asset shares
27th March	7.4 Policy values for policies with cash flows at $\frac{1}{m}$thly intervals	7.5 Policies with continuous cash flows, 7.6 Policy alterations	7.6 Policy alterations (cont.), 7.7 Retrospective policy values, 7.8 Negative policy values, 7.9 Deferred Acquisition expenses and modified premium reserves payments
3rd April	7.9 Deferred Acquisition expenses and modified premium reserves payments (cont.)	Revision	Revision
10th April	Revision	END OF LECTURES	

Sections of the text covered

We expect to cover most of the material in Chapters 1–7 in the textbook.

Students with disabilities

Students with disabilities are encouraged to register as quickly as possible at the Student Accessibility Services if they want to receive academic accommodations. To do so, plese 'phone 494-2836, email access@dal.ca, drop in at the Killam, G28, or visit our website at www.studentaccessibility.dal.ca.

Plagiarism

Plagiarism is a serious academic offense which may lead to loss of credit, suspension or expulsion from the university. Please read the Policy on Intellectual Honesty contained in the Calendar or on the Dalhousie web site at: http://www.registrar.dal.ca/calendar/ug/UREG.htm#12.

Dalhousie Writing Centre

Writing expectations at university are higher than you will have experienced at high school (or if you are entering a master's or PhD program, the expectations are higher than at lower levels). The Writing Centre is a Student Service academic unit that supports your writing development. Make an appointment to discuss your writing. Learning more about the writing process and discipline-specific practices and conventions will allow you to adapt more easily to your field of study.