ACSC/STAT 3703, Actuarial Models I(Further Probability with Applications to Actuarial Science)
Winter 2015
Toby Kenney

Instructor:	Toby Kenney
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Course Website:	www.mathstat.dal.ca/~tkenney/3703/2015/
Office Hours:	Monday 10:30-11:30, Wednesday 10:30-11:30 & Friday 14:30-15:30
Lectures:	MWF: 09:35-10:25 Chase 319
Topics:	Basic Distributional Quantities, Characteristics of Actuarial Models, Continuous Models, Discrete Distributions, Frequency and Severity with Coverage Modifications, Aggregate Loss Models
Textbook:	"Loss Models: From Data to Decisions" (Fourth Edition) by S. A. Klugman, H. J. Panjer and G. E. Wilmot published by Wiley, 2012

Course Work and method of assessment

There will be a midterm exam and a final exam. The midterm will be held in class on Monday 2nd March, and should cover the material in Chapters 2–7. The content of the 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: Monday 13th to Tuesday 28th April.

There will also be (approximately) weekly homework assignments, which must be handed on Thursdays 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* section has questions which are either more challenging, or else raise interesting or important issues that are not central to this course.

Sometimes a question will be started on one sheet, but continued on the following sheet, after the relevant material has been covered. In this case, the full question will be given on the earlier sheet, but the parts that should only be attempted with the later sheet are clearly marked, and are repeated on the later sheet. For some questions, I may occasionally give out a hint, rather than a complete model solution. Revised answers to these questions may then be submitted with the following week's homework.

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
5th January	Introduction and Preliminaries	**1 Random Variables**	**3 Basic Distributional Quantities:** 3.1 Moments, 3.2 Percentiles
12th January	3.3 Generating functions and sums of random variables, 3.4 Tail weight	3.4 Tail weight (cont.), 3.5 Measures of risk	**4 Characteristics of Actuarial models:**4.2 The role of parameters
19th January	**5 Continuous Distributions:** 5.2 Creating new distributions: 5.2.1 Multiplying by a constant, 5.2.2 Raising to a power, 5.2.3 Exponentiation, 5.2.4 Mixing	5.2.5 Frailty models, 5.2.6 Splicing	5.3 Selected distributions and their relationships, 5.3.2 Two parametric families
26th January	5.3.3 Limiting distributions	5.4 The linear exponential family	**6 Discrete Distributions:** 6.2 The Poisson distribution (revision), 6.4 The binomial distribution (revision), 6.3 The negative binomial distribution, 6.5 The $(a, b, 0)$ class
2nd February	6.6 Truncation and modification at zero	**7 Advanced Discrete Distributions:** 7.1 Compound frequency distributions	MONROE DAY
9th February	7.2 The compound Poisson distribution	7.3 Mixed frequency distributions	7.4 Effect of exposure on frequency
16th February	STUDY WEEK		
23rd February	Revision chapters 2–7	Revision chapters 2–7	Revision chapters 2–7
2nd March	MIDTERM EXAM	**8 Frequency and Severity with Coverage Modifications:** 8.2 Deductibles	8.3 Loss elimination ratio and inflation, 8.4 Policy limits
9th March	8.5 Coinsurance, deductibles and limits, 8.6 The impact of deductibles on claim frequency	**9 Aggregate Loss Models:** 9.1 Introduction	9.2 Model choices, 9.3 The compound model for aggregate claims
16th March	9.3 The compound model for aggregate claims (cont.), 9.4 Analytic results	9.5 Computing the aggregate claims distribution, 9.6 the recursive method	9.6 the recursive method (cont.): 9.6.1 Applications to compound frequency models
23rd March	9.6.2 Overflow/Underflow problems, 9.6.3 Numerical stability	9.6.4 Continuous severity, 9.6.5 Constructing arithmetic distributions	9.7 The impact of individual policy modifications on aggregate payments
30th March	9.8 The individual risk model	Revision	GOOD FRIDAY
6th April	EASTER MONDAY		Revision

Sections of the text covered

We expect to cover most of the material in Chapters 2–9 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.