ACSC/STAT 4703, Actuarial Models II
Fall 2015
Toby Kenney

Instructor:	Toby Kenney Department of Mathematics and Statistics Chase Building, Room 202 email: tkenney@mathstat.dal.ca
Course Website:	`www.mathstat.dal.ca/~tkenney/4703/2015/`
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:	Aggregate Loss Models, Nonparametric Estimation, Bayesian Estimation, Model Selection, Credibility Theory, Simulation
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 26th October, and should cover the material in Chapters 9, 11, 12 and 15. 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: 10–20th December.

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* 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	Monday	Wednesday	Friday
7th Sep			Introduction and Preliminaries,**9 Aggregate Loss Models:** 9.1 Introduction
14th Sep	9.2 Model choices, 9.3 The compound model for aggregate claims	9.4 Analytic results,9.5 Computing the aggregate claims distribution	9.6 the recursive method
21st Sep	9.6.1 Applications to compound frequency models, 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,9.8 The individual risk model
28th Sep	9.8 The individual risk model (cont.), **11 Estimation for complete data:** 11.2 The empirical distribution for complete, individual data	11.3 Empirical distributions for grouped data	**12 Estimation for modified data:** 12.1 Point estimation
5th Oct	THANKSGIVING	12.2 Means, variances and interval estimation	12.2 Means, variances and interval estimation (cont.), 12.3 Kernel density models
12th Oct	12.3 Kernel density models (cont.), 12.4 Approximations for large data sets	12.4 Approximations for large data sets (cont.), **15 Bayesian estimation:** 15.2 Inference and prediction	15.3 Conjugate priors and the linear exponential distribution
19th Oct	Revision chapters 9, 11, 12, 15	Revision chapters 9, 11, 12, 15	Revision chapters 9, 11, 12, 15
26th Oct	MIDTERM EXAM	**16 Model selection:** 16.3 Graphical comparison of density and distribution functions, 16.4 Hypothesis tests	16.4 Hypothesis tests (cont.)
2nd Nov	**17 Introduction and limited fluctuation credibility:** 17.2 Limited fluctuation credibility theory, 17.3 Full credibility	17.3 Full credibility (cont.), 17.4 Partial credibility	17.4 Partial credibility, 17.5 Problems with this approach
9th Nov	**18 Greatest accuracy credibility:** 18.2 Conditional distributions and expectation, 18.3 Bayesian methodology	REMEMBRANCE DAY	18.4 The credibility premium
16th Nov	18.5 The Buhlmann model	18.5 The Buhlmann-Straub model, 18.6 exact credibility	**19 Empirical Bayes parameter estimation:** 19.2 Nonparametric estimation
23rd Nov	19.3 Semiparametric estimation	**20 Simulation:** 20.2 Simulation for specific distributions	20.3 Determining the sample size
30th Nov	20.4 Examples of simulation in actuarial modelling	Revision	Revision
7th Dec	Revision		

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.