

ACSC/STAT 4703, Actuarial Models II
Fall 2016
Toby Kenney

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Course Website: www.mathstat.dal.ca/~tkenney/4703/2016/

Office Hours: Monday 10:30-11:30, Wednesday 10:30-11:30 & Thursday 13:00-14:00

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 Wednesday 19th 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.

There will also be (approximately) weekly homework assignments, which must usually 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.

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
5th Sep		Introduction and Preliminaries, 9 Aggregate Loss Models: 9.1 Introduction	9.2 Model choices, 9.3 The compound model for aggregate claims
12th Sep	9.4 Analytic results,9.5 Computing the aggregate claims distribution	9.6 the recursive method	9.6.1 Applications to compound frequency models, 9.6.2 Overflow/Underflow problems
19th Sep	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
26th Sep	9.8 The individual risk model (cont.), 11 Estimation for complete data: 11.2 The empirical distribution for complete, individual data	11.2 The empirical distribution for complete, individual data(cont.), 11.3 Empirical distributions for grouped data 12 Estimation for modified data: 12.1 Point estimation	12.2 Means, variances and interval estimation
3rd Oct	12.2 Means, variances and interval estimation (cont.), 12.3 Kernel density models	12.3 Kernel density models (cont.), 12.4 Approximations for large data sets, 15 Bayesian estimation: 15.2 Inference and prediction	15.3 Conjugate priors and the linear exponential distribution
10th Oct	THANKSGIVING	Revision chapters 9, 11, 12, 15	Revision chapters 9, 11, 12, 15
17th Oct	Revision chapters 9, 11, 12, 15	MIDTERM EXAM	16 Model selection: 16.3 Graphical comparison of density and distribution functions
24th Oct	16.4 Hypothesis tests	16.4 Hypothesis tests (cont.),16.5 Model Selection	17 Introduction and limited fluctuation credibility: 17.2 Limited fluctuation credibility theory, 17.3 Full credibility
31st Oct	17.4 Partial credibility, 17.5 Problems with this approach	18 Greatest accuracy credibility: 18.2 Conditional distributions and expectation, 18.3 Bayesian methodology	18.4 The credibility premium, 18.5 The Buhlmann model
7th Nov	STUDY WEEK		
14th Nov	18.5 The Buhlmann model (cont.), 18.6 The Buhlmann-Straub model, 18.7 exact credibility	18.7 exact credibility(cont.), 19 Empirical Bayes parameter estimation: 19.2 Nonparametric estimation	19.2 Nonparametric estimation(cont.), 19.3 Semiparametric estimation
21st Nov	20 Simulation: 20.2 Simulation for specific distributions	20.2 Simulation for specific distributions (cont.)	20.3 Determining the sample size
28th Nov	20.4 Examples of simulation in actuarial modelling	Revision	Revision
5th Dec	Revision (also on Tuesday 6th December)		

Sections of the text covered

We expect to cover most of the material in Chapters 9,11,12, and 15–20 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, please 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.