ACSC/STAT 4703, Actuarial Models II
Fall 2018
Toby Kenney

Instructor:	Toby Kenney
	Department of Mathematics and Statistics
	Chase Building, Room 102
	email: tkenney@mathstat.dal.ca
Course Website:	www.mathstat.dal.ca/~tkenney/4703/2018/
Office Hours:	Monday 10:30-11:30, Tuesday 13:00-14:00 & Thursday 13:00-14:00
Lectures:	TTF: 10:35-11:25 Chase 319
	Aggregate Loss Models, Nonparametric Estimation, Bayesian
Topics:	Estimation, Model Selection, Credibility Theory, Simulation
	or Pricing and Reserving
Textbook:	"Loss Models: From Data to Decisions" (Fourth Edition)
	by S. A. Klugman, H. J. Panjer and G. E. Wilmot
	published by Wiley, 2012
Additional References:	Short-Term Actuarial Mathematics Study Note
	by the Society of Actuaries (2017). Available at
	https://www.soa.org/Files/Edu/2018/2018-ltam-loss-models-data.pdf
	"Introduction to Ratemaking and Loss Reserving for Property
	and Casualty Insurance" (Fourth Edition), by R. L. Brown
	and W. S. Lennox published by Actex, 2015
	or (Third Edition), 2007, by R. L. Brown and L. R. Gottlieb

Course Work and method of assessment

There will be a midterm exam and a final exam. The midterm will be held in class on Thursday 18th October, and should cover the material in Chapters 9 and 16, along with Chapters 2 and 4 of the additional reference *Introduction to Ratemaking and Loss Reserving for Property and Casualty Insurance.* The content of this exam may be changed, depending on the progress in lectures. The final exam will be arranged during the examination period 7–16th December.

There will also be about 8 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 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.

Occasionally a question may 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	Tuesday	Thursday	Friday
4th Sep	Introduction and Preliminaries,**9 Aggregate Loss Models:** 9.1 Introduction	9.2 Model choices, 9.3 The compound model for aggregate claims	9.4 Analytic results,9.5 Computing the aggregate claims distribution
10th September	9.6 the recursive method	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
17th September	9.7 The impact of individual policy modifications on aggregate payments	9.8 The individual risk model	9.8 The individual risk model (cont.)
24th September	**16 Model selection:** 16.3 Graphical comparison of density and distribution functions	16.4 Hypothesis tests	16.4 Hypothesis tests (cont.),Score-based approaches (AIC, BIC),16.5 Model Selection
1st October	**IRLRPCI 2 Types of short-term insurance coverage:**	**IRLRPCI 4 Loss Reserving:** 4.1 Introduction, 4.2 How outstanding claim payments arise, 4.3 Definition of terms	4.4 Professional Considerations, 4.5 Checking the data, 4.6 Loss reserving methods
8th October	4.6 Loss reserving methods (cont.), 4.7 Discounting loss reserves	Revision chapters 9, 16, IRLRPCI 2, 4	Revision chapters 9, 16, IRLRPCI 2, 4
15th October	Revision chapters 9, 16, IRLRPCI 2, 4	MIDTERM EXAM	**17 Introduction and limited fluctuation credibility:** 17.2 Limited fluctuation credibility theory, 17.3 Full credibility
22nd October	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
29th October	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
5th November	**IRLRPCI 3 Ratemaking:** 3.1 Introduction, 3.2 Objectives of Ratemaking, 3.3 Frequency and Severity	3.4 Data for ratemaking, 3.5 Premium data	3.6 The exposure unit, 3.7 The expected effective period, 3.8 Ingredients of ratemaking
12th November	STUDY WEEK		
19th November	3.9 Rate changes	**IRLRPCI 5 Intermediate topics** 5.1 Individual risk rating plans, 5.2 Increased limits factors	5.2 Increased limits factors (cont.), 5.3 Reinsurance
26th November	Revision	Revision	Revision
3rd December			

Sections of the text covered

We expect to cover most of the material in Chapters 9 and 16–20 of *Loss Models* and also the material in Chapters 1–5 of *Introduction to Ratemaking*.

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.