DALHOUSIE UNIVERSITY
Inspiring Minds

Faculty of Science Course Syllabus
Department of Mathematics and Statistics
Actuarial Models II — ACSC/STAT 4703
Fall 2015

Instructor(s):	Toby Kenney	tkenney@mathstat.dal.ca
Lectures:	MWF 9:35–10:25	Chase 319 (Colloquium Room)
Laboratories:	None	
Tutorials:	None	

Course Description

In ACSC/STAT 3703, we covered a range of models that can be used in actuarial work. In this course we build upon these models, to study various aspects of applying these models, including aggregate loss models, parameter estimation, nonparametric methods, model selection, credibility theory, and simulation.

Course Prerequisites

ACSC/STAT 3703

Course Objectives/Learning Outcomes

- Compute the distribution of Aggregate losses on a portfolio of insurance contracts.
- Calculate the exact distribution for aggregate claims using a compound model in special cases.
- Use a recursive formula to calculate compound distributions where the primary distribution is from the $(a, b, 1)$-class.
- Approximate continous severity distributions by arithmetic distributions.
- Adapt the compound model for aggregate claims to deal with policy modifications.
- Model aggregate claims using an individual risk model.
- Fit distributions to data using the Method of moments and percentile matching

- Use non-parametric estimators for the distribution of random variables — Kaplan-Meier estimators, Nelson-Aalen estimators, Kernel Density estimators.
- Calculate the variance of non-parametric estimators.
- Compute linear and log-transformed confidence intervals for estimators.
- Use Greenwood's approximation to approximate the variance of the Kaplan-Meier product-limit estimator.
- Compute the bias of an estimator.
- Compute nonparametric estimates of the survival function from incomplete data.
- Apply the following tests of goodness of fit: Kolmogorov-Smirnov test, Anderson-Darling test.
- Apply classical credibility theory, in cases with both full and partial credibility.
- Apply the Buhlmann and Buhlmann-Straub models of credibility and understand the connection to Bayesian analysis.
- Calculate credibility premiums using Bayesian analysis.
- Apply empirical Bayesian methods for estimating variances in credibility theory.
- Simulate discrete and continuous random variables using the method of inversion.
- Estimate the number of simulations needed to obtain an estimate with desired properties.
- Use simulation to estimate p-values for an hypothesis test.
- Use bootstrap to estimate the sample distribution of an estimator.

Course Materials

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 Assessment

Component	**Weight (% of final grade)**	**Date**
Midterm Exam	30	26th October (in class)
Final Exam	55	Scheduled by Registrar
Assignments	15	8 assignments, approximately weekly

Other Course Requirements

Conversion of numerical grades to Final Letter Grades follows the Dalhousie Common Grade Scale

A+	(90–100)	**B+**	(77–79)	**C+**	(65–69)	**D**	(50–54)
A	(85–89)	**B**	(73–76)	**C**	(60–64)	**D**	< 50
A-	(80–84)	**B-**	(70–72)	**C-**	(55–59)	**D**	(50–54)

Course Policies

Credit cannot be given for late assignments.

ACCOMMODATION POLICY FOR STUDENTS

Students may request accommodation as a result of barriers related to disability, religious obligation, or any characteristic protected under Canadian Human Rights legislation. The full text of Dalhousies Student Accommodation Policy can be accessed here:

`http://www.dal.ca/dept/university_secretariat/policies/academic/student-accommodation-policy-wef-sep--1--2014.html`

Students who require accommodation for classroom participation or the writing of tests and exams should make their request to the Advising and Access Services Centre (AASC) prior to or at the outset of the regular academic year. More information and the Request for Accommodation form are available at `www.dal.ca/access`

ACADEMIC INTEGRITY

Academic integrity, with its embodied values, is seen as a foundation of Dalhousie University. It is the responsibility of all students to be familiar with behaviours and practices associated with academic integrity. Instructors are required to forward any suspected cases of plagiarism or other forms of academic cheating to the Academic Integrity Officer for their Faculty. The Academic Integrity website (`http://academicintegrity.dal.ca`) provides students and faculty with information on plagiarism and other forms of academic dishonesty, and has resources to help students succeed honestly. The full text of Dalhousies Policy on Intellectual Honesty and Faculty Discipline Procedures is available here:

`http://www.dal.ca/dept/university_secretariat/academic-integrity/academic-policies.html`

STUDENT CODE OF CONDUCT

Dalhousie University has a student code of conduct, and it is expected that students will adhere to the code during their participation in lectures and other activities associated with this course. In general: The University treats students as adults free to organize their own personal lives, behaviour and associations subject only to the law, and to University regulations that are necessary to protect

- the integrity and proper functioning of the academic and nonacademic programs and activities of the University or its faculties, schools or departments;
- the peaceful and safe enjoyment of University facilities by other members of the University and the public;
- the freedom of members of the University to participate reasonably in the programs of the University and in activities on the University's premises;
- the property of the University or its members.

The full text of the code can be found here:
`http://www.dal.ca/dept/university_secretariat/policies/student-life/code-of-student-conduct.html`

SERVICES AVAILABLE TO STUDENTS

The following campus services are available to help students develop skills in library research, scientific writing, and effective study habits. The services are available to all Dalhousie students and, unless noted otherwise, are free.

Service	Support Provided	Location	Contact
General Academic Advising	Help with - understanding degree requirements and academic regulations - choosing your major - achieving your educational or career goals - dealing with academic or other difficulties	**Killam Library Ground floor** Rm G28 **Bissett Centre for Academic Success**	In person: Killam Library Rm G28 By appointment: - e-mail: advising@dal.ca - Phone: (902) 494-3077 - Book online through MyDal
Dalhousie Libraries	Help to find books and articles for assignments Help with citing sources in the text of your paper and preparation of bibliography	**Killam Library Ground floor** Librarian offices	In person: Service Point (Ground floor) By appointment: Identify your subject librarian (URL below) and contact by email or phone to arrange a time: `http://dal.beta.libguides.com/sb.php?subject_id=34328`
Studying for Success (SFS)	Help to develop essential study skills through small group workshops or one-on-one coaching sessions Match to a tutor for help in course-specific content (for a reasonable fee)	**Killam Library 3rd floor** Coordinator Rm 3104 Study Coaches Rm 3103	To make an appointment: - Visit main office (Killam Library main floor, Rm G28) - Call (902) 494-3077 - email Coordinator at: `sfs@dal.ca` or - Simply drop in to see us during posted office hours All information can be found on our website: `www.dal.ca/sfs`
Writing Centre	Meet with coach/tutor to discuss writing assignments (e.g., lab report, research paper, thesis, poster) - Learn to integrate source material into your own work appropriately - Learn about disciplinary writing from a peer or staff member in your field	**Killam Library Ground floor** Learning Commons & Rm G25	To make an appointment: - Visit the Centre (Rm G25) and book an appointment - Call (902) 494-1963 - email `writingcentre@dal.ca` - Book online through MyDal We are open six days a week See our website: `writingcentre.dal.ca`