

## ACT451H1F/STA2500 LOSS MODELS Fall 2015

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Office hours: Wednesdays 10am-noon, 2pm-4pm or by appointment.  
Lecture times and locations: Tuesdays 11:10am-noon, SS2105; Thursdays 10:10am-noon, GB221.

**Prerequisite:** STA261 **Co-requisites:** ACT348, and STA347.

According to the FAS regulations, if you are missing the prerequisite you must submit a waiver form to me for approval. The form can be downloaded from

<http://www.utstat.toronto.edu/wordpress/wp-content/uploads/2011/09/request-for-prereq-or-coreq-waiver.pdf>

Please submit a filled waiver form by Thursday Sept 24, or you will be removed from the course on Friday Sept 25. ACT348 and STA347 are co-requisites so as long as you are taking them this semester, you do not need my permission to enroll in this course.

### Required Textbook

Broverman, S., ACTEX Study Manual for the SOA Exam C and CAS Exam 4, Fall 2014 Edition, Volume One.

The study manual has two volumes and is available at ACTEX Publications (<http://www.actexamdriver.com/>). Volume One will also be used for ACT452 in the Winter semester. Part of the second volume is for ACT466. I have posted the first 6 sections of the study manual on my website for you to download. Please purchase a copy of the study manual as soon as possible.

### Calculators

Only one of the following calculators is allowed in the midterm test and the final exam: BA-35, BAI Plus, BA II Plus Professional Edition, TI-30Xa, TI-30XIIS, TI-30XIIB, TI-30XS MultiView, and TI-30XB MultiView. They are also the calculators allowed in the SOA exams.

This course will cover Sections 5-21 of the study manual. I will very briefly review the materials in Sections 1-4 during the first week. As the title of the study manual indicated, this course covers part of the SOA Exam C syllabus. The rest is covered in ACT452 and ACT466. I will also teach some topics that are not covered by the SOA Exam C but useful in insurance modelling.

### Topics and Tentative Schedule

Week of Sept 14: review of key concepts and formulas in probability theory.

Week of Sept 21: parametric distributions; transformations; linear exponential family.

Week of Sept 28: hazard rate function, risk measures, VaR and TVaR (Section 21) right tail

behaviour.

Week of Oct 5: mean residual lifetime, equilibrium distributions, applications to risk management.

Week of Oct 12: finite and continuous mixtures, insurance interpretation, distributional properties.

Week of Oct 18: spliced distributions, frailty models, Erlang-based univariate mixture models, properties, Tijm's approximation, EM algorithm, data-fitting examples.

Week of Oct 26: policy limit, LER. A midterm test will be given on Thursday Oct. 29 from 10:30am to 12:00pm (90 minutes) in GB221.

Week of Nov 2: other policy modifications, deductibles, stop-loss premium, co-pay, inflation adjustment.

Week of Nov 9: Nov 9 and 10 are the fall break. The class resumes on Thursday Nov 12. claim severity, claim frequency, zero-modified frequency distributions.

Week of Nov 16: the  $(a, b, 0)$  and  $(a, b, 1)$  classes.

Week of Nov 23: aggregate claims and compound distributions, recursive calculation; application to operational risk management.

Week of Dec 1: Impact of individual policy modifications on the aggregate payments,

Week of Dec 7: stop-loss insurance on aggregate claims, information on the final exam.

### Quizzes, Test and Exam

Five 10-minutes in-class pop quizzes will be given during the semester. There will be no make-up quizzes. The best four quizzes will be counted, 1.5% each, towards the final mark. There will be no homework but I will assign practice problems from the study manual every Thursday or Friday and they will be posted on my teaching website. A midterm test will take place on Thursday October 29 and it accounts for 37% of the final mark. Should you be forced to miss the test, you are required by faculty regulations to submit, within one week, appropriate documentation from the U of T Health Services to me or to the Departmental Office SS6018 (Print on it your NAME, STUDENT NUMBER, course number, and date.). **And you must contact me to arrange a time within one week for an individual oral makeup test.** A written-answer final exam (2 hours) will be given during the faculty exam period. The final exam accounts for 57% of the final mark.

### The Code of Behaviour on Academic Matters

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