

ACT451H1F/STA2500 LOSS MODELS Fall 2014

Instructor: X. Sheldon Lin Office: 6006 Sidney Smith
Phone: (416) 945-5969 Email: sheldon@utstat.utoronto.ca
Website: www.utstat.utoronto.ca/sheldon/teaching.html
Office hours: Wednesdays 10am-noon, 2pm-4pm or by appointment.
Lecture Times: Tuesdays 11:10am-noon, Thursdays 10:10am-noon. Location: RW117.

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

If you are taking ACT348 and STA347 this semester you do not need my permission to enroll in this course. According the FAS regulations, if you are missing any prerequisites for the course 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 18. If you miss any prerequisites and do not have your waiver request approved, you will be removed from the course on Friday Sept 19.

Required Textbook

Broverman, S., ACTEX Study Manual for the SOA Exam C and CAS Exam 4, 2013 or 2014 Edition, Volume One.

The study manual has two volumes and is available at ACTEX Publications (<http://www.actexamdriver.com/>). Volume One is also used for ACT452 in the Winter semester. Part of the second volume is for ACT466. I will post 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 topics such as Erlang-based mixture models with applications in insurance. Time permitting, I will cover copula theory. Both topics are not in the study manual nor covered in the SOA exam.

Topics and Tentative Schedule

Week of Sept 7: review of key concepts and formulas in probability theory.

Week of Sept 14: parametric distributions; transformations; linear exponential family.
Week of Sept 21: hazard rate function, risk measures, VaR and TVaR (Section 21) right tail behaviour.
Week of Sept 28: mean residual lifetime, equilibrium distributions, applications to risk management.
Week of Oct 5: finite and continuous mixtures, insurance interpretation, distributional properties.
Week of Oct 12: spliced distributions, frailty models, Erlang-based univariate mixture models, properties, Tijm's approximation, EM algorithm, data-fitting examples.
Week of Oct 19: policy limit, LER. A midterm test will be given on Thursday Oct. 23 from 10:30am to 12:00pm (90 minutes). Location: TBA
Week of Oct 26: other policy modifications, deductibles, stop-loss premium, co-pay, inflation adjustment.
Week of Nov 9: claim severity, claim frequency, zero-modified frequency distributions, the $(a, b, 0)$ and $(a, b, 1)$ classes.
Week of Nov 16: No classes. Nov 17 and 18 are the fall break. The Thursday class is rescheduled to Wednesday December 3.
Week of Nov 23: aggregate claims and compound distributions, recursive calculation; application to operational risk management.
Week of Nov 30: Tuesday: stop-loss insurance on aggregate claims. Wednesday: multivariate mixture models, copulas, dependence measures, real world applications.

Quizzes, Test and Exam

Five 10-minutes in-class pop quizzes will be given during the semester. There are 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 website. A midterm test will take place on Thursday October 23 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

Visit www.artsci.utoronto.ca/osai/students