ACT451H1F/STA2500 LOSS MODELS Fall 2016

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Office hours: Wednesdays 10am-noon, 2pm-4pm or by appointment.
Lecture times and locations: Tuesdays 11:10am-noon, Thursdays 10:10am-noon; Sidney Smith 1085.

Prerequisite: STA261 **Co-requisites:** ACT348, and STA347.
According 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 22, or you will be removed from the course on Friday Sept 24. 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 2015 or later Edition, Volume One.

The study manual has two volumes and is available at
ACTEX Publications (http://www.actexmadriver.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, BAII 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 12: review of key concepts and formulas in probability theory.
Week of Sept 19: parametric distributions; transformations; linear exponential family.
Week of Sept 26: hazard rate function, risk measures, VaR and TVaR (Section 21) right tail

behaviour.
Week of Oct 3: mean residual lifetime, equilibrium distributions, applications to risk management.
Week of Oct 10: finite and continuous mixtures, insurance interpretation, distributional properties.
Week of Oct 17: spliced distributions, frailty models, Erlang-based univariate mixture models, properties, Tijm's approximation, EM algorithm, data-fitting examples.
Week of Oct 24: policy limit, LER. A midterm test will be given on Thursday Oct. 27 from 10:30am to 12:00pm (90 minutes). Location: TBA.
Week of Nov 3: other policy modifications, deductibles, stop-loss premium, co-pay, inflation adjustment.
Week of Nov 7: Nov 7 and 8 are the fall break. The class resumes on Thursday Nov 12. claim severity, claim frequency, zero-modified frequency distributions.
Week of Nov 14: the $(a, b, 0)$ and $(a, b, 1)$ classes.
Week of Nov 21: aggregate claims and compound distributions, recursive calculation; application to operational risk management.
Week of Nov 28: Impact of individual policy modifications on the aggregate payments,
Dec 6: stop-loss insurance on aggregate claims, review topics in 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 90 minutes midterm test will take place from 10:20am to 11:50am on Thursday October 27 in SS1085. The test 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

Canadian Institute of Actuaries (CIA)'s University Accreditation Program (UAP)

ACT451 is an accredited course under the UAP program. The minimum grade needed to apply for an exemption is 75. For detailed information on UAP, please visit the following webpages:

- University Accreditation Program description (http://www.cia-ica.ca/membership/uap)

- List of accredited courses offered by University of Toronto:
  http://www.cia-ica.ca/membership/uap/accredited/toronto
- How to apply for CIA exemptions:
  http://www.cia-ica.ca/membership/uap/information-for-students

Note: The CIA will grant credits to students for SOA/CAS examinations based on the achievement of the minimum Grade towards Associateship (ACIA) and Felllowship (FCIA) in the CIA. At the time of this agreement, CIA credits are recognized by the following actuarial organizations towards their respective designations:
Casualty Actuarial Society (CAS): ACAS, FCAS
UK Institute and Faculty of Actuaries (IFoA): FIA, AIA
Institute of Actuaries of Australia (IAA): AIAA, FIAA
Actuarial Society of South Africa (ASSA): AMASSA, FASSA
American Academy of Actuaries (AAA): MAAA

The CIA does not guarantee that credits granted to students under the CIA UAP will be recognized by any other actuarial organizations towards their actuarial designations.