ACT451H1F/STA2500 Loss Models Fall 2019

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Website: `www.utstat.utoronto.ca/sheldon/teaching.html`
Office hours: Thursdays 1pm-3pm or by appointment.
Lecture times and location: Tuesdays 11:10am-noon, Thursdays 10:10am-noon; UC244.

Prerequisite: STA257.
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 Tuesday Sept 17, or you will be removed from the course on Wednesday Sept 19.

Required Textbook
Broverman, S., ACTEX Study Manual for SOA Exam STAM, the 2019 Edition.
The title of older editions ACTEX Study Manual for the SOA Exam C and CAS Exam 4, Fall 2016 or later Edition, Volume One.

The study manual is available for purchase at
ACTEX Publications (`http://www.actexmadriver.com/`). The manual will also be used for ACT452 and ACT466 in the Winter semester. I will post the first 6 sections of the study manual before the class starts 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 on Thursday, Sept 5. As the title of the study manual indicated, this course covers part of the SOA Exam STAM syllabus the rest of which is covered in ACT452 and ACT466. I will also teach some topics that are not covered by the SOA Exam but useful in insurance modelling.

Topics and Tentative Schedule
Sept 5: review of key concepts and formulas in probability theory (Sections 1-4).
Week of Sept 8: parametric counting and continuous distributions; transformations (Section 5).
Week of Sept 15: linear exponential family (Section 5); hazard rate function, mean residual

lifetime (Section 6).
Week of Sept 22: classification of right tail behaviour (Section 6), risk measures, VaR and TVaR, insurance applications, applications to risk management (Section 21).
Week of Sept 29: finite and continuous mixtures, insurance interpretation, distributional properties, Erlang-based univariate mixture models (Sections 7-9).
Week of Oct 6: Tijm's approximation to Erlang mixture models, data-fitting examples, spliced distributions, frailty models (Section 9).
Week of Oct 13: groud up loss, policy limit, LER (Section 11). A midterm test will be given on Thursday Oct. 17 from 10:20am to 11:50pm (90 minutes) in class.
Week of Oct 20: other policy modifications, deductibles, stop-loss premium (Sections 12-13).
Week of Oct 27: co-pay, inflation adjustment, claim severity, claim frequency, zero-modified frequency distributions (Section 13-16).
Week of Nov 3: Fall break. No class.
Week of Nov 10: the $(a, b, 0)$ and $(a, b, 1)$ classes (Section 10).
Week of Nov 17: aggregate claims and compound distributions, recursive calculation (Sections 17-18) .
Week of Nov 24: Impact of individual policy modifications on the aggregate payments (Section 19)
Dec 3: stop-loss insurance on aggregate claims, review topics in the final exam (Section 20).

Quizzes, Test and Exam
Five 10-minutes in-class pop up quizzes will be given during the semester. There will be no make-up quizzes. The best four quizzes will be counted, 1.5% each, toward the final mark. There will be no homework but I will post practice problems from the study manual weekly on my teaching website. A 90 minutes midterm test will take place from 10:20am to 11:50am on Thursday October 17 in UC244. 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.