ACT451H1F/STA2500 Loss Models Fall 2021

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Teaching website: `https://utstat.utoronto.ca/sheldon/teaching.html`
Office hours: Wednesdays from 1-3pm by Zoom `https://utoronto.zoom.us/j/83210812025` or by appointment.
Lectures by Zoom: Tuesdays 11:10am-noon `https://utoronto.zoom.us/j/87930878900`; Thursdays 10:10am-noon `https://utoronto.zoom.us/j/83942842172`.
Please note that there are no passwords nor waiting room for these zoom meetings so you can join in any time.

Course Prerequisite: STA257. In addition, the actuarial program requires you to have ACT240+245+247(63%+) to move onto 3rd and 4th year ACT core courses including this course. This requirement is strictly enforced.

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
`https://utstat.storonto.ca/wordpress/wp-content/uploads/2011/09/request-for-prereq-or-coreq-waiver.pdf`
and contact the Undergard Chair for actuarial science Professor Sam Broverman (ugchair.actsci@utoronto.ca) within two weeks. If you fail to do so, Prof Broverman will remove you from the class at the end of two weeks.

Required Textbook
Broverman, S., ACTEX Study Manual for SOA Exam STAM - Short Term Actuarial Mathematics, Fall 2019 Edition or newer.

The study manual is available for purchase at ACTEX Publications (`https://www.actexmadriver.com/OrderSelection.aspx`). Please purchase a copy of the study manual as soon as possible. I will be teaching ACT452 in the winter using the same textbook. The manual will also be used for ACT466 in the winter. the first 6 sections of the study manual will be posted at my teaching website for you to download in case your copy does not arrive in time.

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. These are the calculators allowed in the SOA exams.

Course Details

This course will cover Sections 5-21 of the study manual. I will very briefly review the materials in Sections 1-3 on Thursday, Sept 9. As the title of the study manual indicated, this course covers part of the topics in the SOA STAM Exam. Other topics of the SOA exam are covered in ACT452 and ACT466. I will also teach some topics that are not covered in the SOA exam but useful in insurance modelling.

Topics and Tentative Schedule

Sept 9: review of key concepts and formulas in probability theory (Sections 1-3).
Week of Sept 12: parametric counting and continuous distributions; transformations (Section 5).
Week of Sept 19: linear exponential family (Section 5); hazard rate function, mean residual lifetime (Section 6).
Week of Sept 26: classification of right tail behaviour (Section 6), risk measures, VaR and TVaR, insurance applications, applications to risk management (Section 21).
Week of Oct 3: finite and continuous mixtures, insurance interpretation, distributional properties, Erlang-based univariate mixture models (Sections 7-9).
Week of Oct 10: Tijm's approximation to Erlang mixture models, data-fitting examples, spliced distributions, frailty models (Section 9); frequency models, the $(a, b, 0)$ and $(a, b, 1)$ classes (Section 10).
Week of Oct 17: zero-modified frequency models (Section 10).
An in person 90-minute midterm test is planed (subject to the university pandemic rule change) on Thursday Oct. 21 from 10:30am to 12pm. Location TBA.
Week of Oct 24: ground up loss, policy limit, LER (Section 11); cost per loss, deductibles (Section 12).
Week of Oct 31: cost per payment, combined limit and deductible (Sections 13-14)
Week of Nov 7: Fall break. No class.
Week of Nov 14: other policy modifications (Sections 15-16); aggregate claims (Review of Section 4, Section 17).
Week of Nov 21: compound distributions, recursive calculation (Sections 17-18) .
Week of Nov 28: Impact of individual policy modifications on the aggregate payments (Section 19)
Dec 7: stop-loss insurance on aggregate claims, review topics in the final assessment/exam (Section 20).

Online Teaching, Assignments, Exams and Others

Lectures

Due to the Covid pandemic, the teaching will still be conducted online using Zoom with the links given above. Please make sure you have access to Zoom. During a lecture, I will use the share screen function to show my notes. If you have a question, use the chat room to post it. I will record each lecture when possible, and post it and the pdf of the notes afterward at my teaching website, in case you have missed it.

Office hours
The University has changed its pandemic rule and now does not allow to have in person office hours at OPG. As a result, I will only have online office hours over Zoom using the link above from 1pm to 3pm of every Wednesday. You are also encouraged to email me if you have any questions and your questions do not have to be limited to the course materials. I am happy to provide advice on job interview/resume writing, career developments, company information, graduate schools, etc. Basically everything you want to ask!

Quizzes
There will be five 10-minutes in-class online pop up quizzes during the semester. I will post a quiz using share screen and you will need to email your answer in 10 minutes to act451h1@gmail.com for the TA to grade. There will be no makeup quizzes.

Tutorials
We plan to have two either in-person or online tutorials: one before the midterm and one before the final, to help you prepare for the exams. The TAs will go through some past exam questions and answer your questions.

Homeworks
There will be no homework but I will post practice problems from the study manual weekly at my teaching website.

Midterm and final assessment
The plan is to have a 90-minutes in person midterm on Thursday Oct 21 from 10:20am to 11:50am. A 2-hour in person final assessment/exam will tentatively be given during the final assessment week. The date will be set by the FAS. All the in person exams are still subject to the University pandemic rules and might be moved to online.

Grading
The best four quizzes will be counted, 2.5% each, toward the final grade. The midterm accounts for 40% of the final grade and the final exam accounts for 50% of the final grade. Should you be forced to miss the midterm, 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 in person oral makeup test.**

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 (`https://www.cia-ica.ca/membership/university-accreditation-program-home`)
- List of accredited courses offered by University of Toronto:

https://www.cia-ica.ca/membership/university-accreditation-program-home/accredited-universities/accredited-university-detail?pav_universityid=06f6b138-61e5-

- How to apply for CIA exemptions:
  https://www.cia-ica.ca/membership/university-accreditation-program-home/information-for-candidates/obtaining-uap-credits

  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.