

ACT451H1F/STA2500 Loss Models Fall 2020

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Teaching website: www.utstat.utoronto.ca/sheldon/teaching.html

Office hours: Fridays from 1-3pm by Zoom <https://utoronto.zoom.us/j/91211316765>.

Lectures by Zoom: Tuesdays 11:10am-noon <https://utoronto.zoom.us/j/98494612564>;

Thursdays 10:10am-noon <https://utoronto.zoom.us/j/94217383377>.

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 such as this course. This requirement is strictly enforced.

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>

Required Textbook

Broverman, S., ACTEX Study Manual for SOA Exam STAM - Short Term Actuarial Mathematics, Fall 2020 Edition.

The study manual is available for purchase at ACTEX Publications (<https://www.actexamdriver.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, BAI 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.

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 10. 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 10: review of key concepts and formulas in probability theory (Sections 1-4).

Week of Sept 13: parametric counting and continuous distributions; transformations (Section 5).

Week of Sept 20: linear exponential family (Section 5); hazard rate function, mean residual lifetime (Section 6).

Week of Sept 27: classification of right tail behaviour (Section 6), risk measures, VaR and TVaR, insurance applications, applications to risk management (Section 21).

Week of Oct 4: finite and continuous mixtures, insurance interpretation, distributional properties, Erlang-based univariate mixture models (Sections 7-9).

Week of Oct 11: Tijm's approximation to Erlang mixture models, data-fitting examples, spliced distributions, frailty models (Section 9).

Week of Oct 18: ground up loss, policy limit, LER (Section 11). An online midterm test will be given on Thursday Oct. 22 from 10:20am to 11:50am. I will post the questions at Quercus and my teaching website for you to download. You must email your answers with your name and student number on the subject line to act451h1@gmail.com before 11:55am.

Week of Oct 25: other policy modifications, deductibles, stop-loss premium (Sections 12-13).

Week of Nov 1: co-pay, inflation adjustment, claim severity, claim frequency, zero-modified frequency distributions (Section 13-16).

Week of Nov 8: Fall break. No class.

Week of Nov 15: the $(a, b, 0)$ and $(a, b, 1)$ classes (Section 10).

Week of Nov 22: aggregate claims and compound distributions, recursive calculation (Sections 17-18) .

Week of Nov 29: Impact of individual policy modifications on the aggregate payments (Section 19)

Dec 8: stop-loss insurance on aggregate claims, review topics in the final exam (Section 20).

Online Teaching, Assignments, Exams and Others

Lectures

Due to the Covid pandemic, the teaching will 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

I will open the zoom meeting from 1pm to 3pm of each Friday. You may drop in any time. 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, and things like that. If the situation is allowed, I may have in-person office hours during the same time

period.

Quizzes

There will be five 10-minutes in-class 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.

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

A 90-minutes online midterm will be given on Thursday Oct 22 from 10:20am to 11:50am. A 2-hour second test in lieu of the final exam will be given in the week of December 13. The exact date will be announced later. Like the quizzes, you must email your answers to act451h1@gmail.com in 5 minutes after the end of the test/assessment period.

Grading

The best four quizzes will be counted, 1.5% each, toward the final assessment. The midterm accounts for 37% of the final assessment and the second test accounts for 57% of the final assessment.

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 online 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 (<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 Fellowship (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.