

ACT451H1F/STA2500 Loss Models Fall 2022

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Teaching website: <https://utstat.utoronto.ca/sheldon/teaching.html>

Office hours: Thursdays from 1-3pm in person. If you can not make it make an appointment with me.

Lectures: Tuesdays 11:10am-noon; Thursdays 10:10am-noon. Location: Medical Science Building MS4279.

Zoom links in case we need to switch the lectures online: Tuesdays <https://utoronto.zoom.us/j/85025416576> Thursdays <https://utoronto.zoom.us/j/85929049579>

Please note that there are no passwords nor waiting room for these zoom meetings so you can join in any time.

Course Prerequisites: STA257, ACT240 (minimum 63%), ACT245 (minimum 63%), ACT247 (minimum 63%). These requirements are strictly enforced.

If you do not meet the above requirements, please contact me or the Undergard Chair for actuarial science Professor Vicki Zhang (ugchair.actsci@utoronto.ca) within two weeks. If you fail to do so, Prof Zhang will remove you from the class at the end of two weeks.

Required Textbook

Broverman, S., ACTEX Study Manual for SOA Exam FAM-S, Fall 2022 Edition.

The study manual is available for purchase at ACTEX Publications (<https://www.actexamdriver.com/OrderSelection.aspx?terms=>). You will get a discount of 20% with coupon code SAM8D97F0A6. The code will expire on Oct 15th. Please use your university email to open an account with ACTEX that also serves as a verification. Also please do not give the code away. The website provides three purchase options. The first two are a digital copy that will expire in 6 and 12 months, so I strongly recommend that you purchase a hard copy (Option 3). I will be teaching ACT452 in the winter using the same manual and other free notes.

The first 6 sections of the study manual will be posted at Quercus for you to download in case your copy does not arrive in time.

Calculators

Only one of the following calculators is allowed in the exams: 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.

Course Details

This course will cover Sections 5-19 of the study manual. I will very briefly review the materials in Sections 1-3 on Thursday, Sept 8. As the title of the study manual indicated, this course covers part of the topics in the SOA FAM Exams below. I will also teach some topics that are not covered in the SOA exams but useful in insurance modelling.

The SOA has redesigned the ASA Exams again. The topics used to be in LTAM and STAM have been rearranged along with a few new topics in four exams: FAM-S, FAM-L, Advanced LTAM (ALTAM) and ASTAM. FAM-S and FAM-L exams will be offered this year and they will be combined into one in the future. ALTAM and ASTAM start in 2023.

Topics and Tentative Schedule

Week 1: review of key concepts and formulas in probability theory (Sections 1-3).

Week 2: parametric counting and continuous distributions; transformations, linear exponential family (Section 5)

Week 3: hazard rate function, mean residual lifetime, classification of right tail behaviour (Section 6), risk measures, VaR and TVaR, insurance applications, applications to risk management (Section 19).

Week 4: finite mixtures, insurance interpretation, distributional properties, spliced distributions, frailty models (Sections 7-8), Erlang-based univariate mixture models (not in the textbook).

Week 5: Test One on Tuesday Oct 4 at 11am in class; Tijm's approximation to Erlang mixture models, data-fitting examples (not in the textbook), ; Continuous mixtures (not in the textbook).

Week 6: frequency models, zero-modified frequency models the $(a, b, 0)$ and $(a, b, 1)$ classes (Section 9).

Week 7: ground up loss, policy limit, LER (Section 10); cost per loss, deductibles, cost per payment (Section 10-13).

Week 8: combined limit and deductible, other policy modifications (Sections 14-15)

Week 9: aggregate claims, compound distributions (Review of Section 4, Section 16).

Week 10: Test Two on Tuesday Nov 15 at 11am in class; recursive calculation (Sections 16)

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Week 11: Impact of individual policy modifications on the aggregate payments (Section 16)

Week 12: stop-loss insurance on aggregate claims (Sections 17-18).

Week 13: Test Three Tuesday Dec 6 at 11am in class.

Lectures, Assignments, Exams and Others

Lectures

All the lectures will be conducted in person. After each lecture, I will post the pdf of the notes at Quercus. In case that I cannot make to a class I will teach online using the zoom link above. 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 that lecture and post it at MyMedia.

Office hours

Thursdays from 1pm to 3pm in person. In addition to the course materials, I am happy to provide advice on job interview/resume writing, career developments, company information, graduate schools, and things in that nature.

Quizzes

There will be five 10-minutes in-class quizzes during the semester, to be announced 2-3 days in advance. There will be no makeup quizzes.

Homework

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

Assessments

I will give three one-hour in-class term tests. The dates are: Test 1, Oct 4, 11am-noon; Test 2, Nov 15, 11am-noon, Test 3, December 6, 11am-noon.

Marking Scheme

The best four quizzes will be counted, 2.5% each, toward the final grade. Test One will account for 30%, Test Two 35% and Test Three 25% of the final grade.

Should you be forced to miss a term test, you must contact me to arrange a time within one week for an individual 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)

This course is one of the mandatory courses under Canadian Institute of Actuaries (CIA)'s University Accreditation Program (UAP). UAP has moved away from the course-by-course accreditation method and towards program accreditation method (the "Pathway 1 of CIA qualification"). Under the new pathway, in order to obtain ACIA (Associate of CIA) professional credential, students need to:

1. Complete a degree from an actuarial program (ACT Specialist or Major) at University of Toronto and pass a list of mandatory courses. No minimum course grade or GPA is required as long as students pass all the mandatory courses. The full list of UofT's 16 mandatory courses are: ACT240, ACT245, ACT247, ACT348, ACT349, ACT370, ACT451, ACT452, ACT466, STA257, STA261, STA302, STA314, ECO101, ECO102, MGT201/RSM219.

For transition: CIA will accept an actuarial degree from UofT completed between June 30, 2015 and October 31, 2023 without all the specified mandatory courses.

2. Complete the ACIA Module (administered by CIA, projected Spring 2023).

For transition: a student can be exempt from the ACIA Module if they complete SOA exam PA and the 8 FAP Modules and assessments by December 31, 2023.

3. Complete an open-book ACIA Capstone Exam (administered by CIA, projected Fall 2023).

For transition: a student can be exempt from the capstone exam by completing any combi-

nation of UAP credits or exams for P, FM, IFM, LTAM, STAM and SRM by October 31, 2023. The deadline to apply for UAP credits is September 30, 2023. Details on the new pathway for students can be found here: <https://education.cia-ica.ca/acia/acia-for-accredited-university-students/>