ACT451H1F/STA2500 Loss Models Fall 2024

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Lectures: Tuesdays 11:10am-noon; Thursdays 10:10am-noon. Location: GB220.

Office hours: Thursdays from 4:10-5:30pm in person. If you can not make it, schedule an appointment with me.

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. Vicki Zhang will remove you from the class at the end of two weeks.

Textbook
Study Manual for SOA Exam ASTAM, 3rd Edition, by Samuel Broverman and Wenjun Jiang. The second edition is fine too as there are very minimal changes.

The study manual is available for purchase at ACTEX Learning (`https://www.actexmadriver.com/OrderSelection.aspx?terms=`). The website provides three purchase options. The first two are a digital copy that will expire in 6 and 12 months (I think), so I strongly recommend that you purchase a hard copy (Option 3). ACT452 in the winter will be using the same manual.
The first 6 sections of the study manual has been posted at Quercus for you to download in case your copy does not arrive in time.

Calculators
Only non-programable calculators are allowed in the exams. I strongly recommend you use the following models as they are approved by the SOA for its exams: BA-35, BAII Plus, BA II Plus Professional Edition, TI-30Xa, TI-30XIIS, TI-30XIIB, TI-30XS MultiView, and TI-30XB MultiView.

Course Details

The SOA redesigned the ASA Exams a couple of years ago. The topics used to be in LTAM and STAM have been rearranged along with a few new topics in three exams: FAM (Fundamential Actuarial Math that covers the basics of Life Contingencies and Nonlife Math-

ematics), Advanced LTAM (ALTAM) and ASTAM. To become an ASA you need to pass FAM and one of ALTAM and ASTAM.

This course will help you prepare for the non-life part of the SOA FAM and part of the SOA ASTAM Exam (the other two are ACT452 and ACT466). We will cover Sections 5-20 of the study manual, although I will also very briefly review the materials in Sections 1-3 during the first week. The lectures will emphasize on how probability models may apply to insurance.

Topics and Tentative Schedule

Week 1: Review of key concepts and formulas in probability theory (Sections 1-3).
Week 2: No class on Tuesday. Parametric counting and continuous distributions (Section 5) on Thursday.
Week 3: More distributions and transformations (Section 5).
Week 4: Hazard rate function, mean residual lifetime, classification of right tail behaviour (Section 6). Risk measures, VaR and TVaR, insurance applications, applications to risk management (A topic in FAM).
Week 5: Test One on Thursday Oct 3, 10:10am-11:10am. Location EX320. Finite mixtures, insurance interpretation, distributional properties, spliced distributions (Sections 7-8).
Week 6: Erlang mixture models, data-fitting examples (extra material).
Continuous mixtures, conjugate pairs (Section 9).
Week 7: Frequency models, zero-modified frequency models, the $(a, b, 0)$ and $(a, b, 1)$ classes (Section 10).
Week 8: Ground-up loss, policy limit, LER (Section 11). Cost per loss, deductibles, cost per payment (Sections 12-14).
Week 9: Test Two tentatively on Tuesday Nov 5, 11:10am-12:10am. Location TBA. Combination of policy limit and deductible, other policy modifications (Sections 15-16).
Week 10: Review of multivariate distributions (Section 4). Aggregate losses/claims, compound distributions (Section 17).
Week 11: Recursive calculation (Section 18). Impact of individual policy modifications on the aggregate payments (Section 19).
Week 12: Stop-loss insurance on aggregate claims (Section 20). Test Three: tentatively on Thursday Nov 28, 10:10am-11:10am. Location TBA.

Lectures, Assignments, Exams and Others

Lectures
All the lectures will be conducted in person. Before and after each lecture, I will post the pdf of the lecture notes gain at Quercus, if there are some changes in them . In case that I cannot teach in person, I will teach online using Zoom. In that case I will record the lecture and post it at MyMedia.
Office hours
Thursdays from 4:10pm to 5:30pm in person. In addition to answering questions on the

course materials, I am more than 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. Their dates and coverage will 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 Quercus.

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 test (new questions).

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 is now based on a program accreditation method. Under the new credentialing pathway (Pathway 1), 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.
2. Complete the ACIA Modules available from Fall 2023.
3. Complete an open-book ACIA Capstone Exam available from January 2024.

Details on the pathway for students from an actuarial program can be found here: `https://education.cia-ica.ca/pathway-1/`