

ACT452H1S Loss Models II Winter 2021

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

Office hours: Fridays from 1-3pm by Zoom <https://utoronto.zoom.us/j/86756774775>, or by appointment.

Lectures by Zoom: Wednesdays 10:10am-noon <https://utoronto.zoom.us/j/81962179850>;

Fridays 10:10am-11am <https://utoronto.zoom.us/j/88044063308>.

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

Course Prerequisite: STA261 and ACT451. 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

<https://utstat.utoronto.ca/wordpress/wp-content/uploads/2011/09/request-for-prereq-or-coreq-waiver.pdf>

Required Textbooks

Survival Analysis and Nonparametric Estimation

LTAM Notes (Sections 41-43) by Sam Broverman that is attached to the first announcement.

Statistical Estimation and Tests

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

If you took ACT451 from me the last semester you should have a copy of the ACTEX manual. Otherwise, purchase a copy from <https://www.actexamdriver.com/OrderSelection.aspx>

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.

Course Description

This course will cover the statistical aspects of insurance loss models. Due to the recent changes in SOA exams, they are now split into two exams: LTAM and STAM. The LTAM part is on **survival analysis and nonparametric estimation** and the STAM part is about

statistical estimation and tests for parametric distributions. I will cover both so that you can properly prepare for both exams. I will begin with survival analysis and non-parametric estimation using study notes by Prof Broverman for LTAM followed by statistical estimation and tests for parametric distributions. The latter are covered in Sections 22-31 of the study manual. If time permits, I may teach some topics (such as fitting algorithms for mixture models) that are not covered in the SOA exams but useful in insurance modelling.

Topics and Tentative Schedule

Weeks 1 and 2: Review of Math Stats, Complete Data and Grouped Data and their Empirical Estimates (STA261; STAM Sections 22 and 28; LTAM Section 41).

Week 3: Censored and Truncated Data, the Kaplan-Meier and Nelson-Aalen Estimators (LTAM Section 42).

Weeks 4 and 5: Delta Method, Analysis of Empirical/Kaplan-Meier and Nelson-Aalen Estimators (LTAM Section 43).

Week 6: Midterm and MLE based on Complete Data (STAM Section 23).

Weeks 7 and 8: MLE based on Complete Data, Cont'd, MLE based on Incomplete Data (STAM Section 24).

Week 9: Applications to parametric distributions and the EM algorithm for mixtures (STAM Sections 25-27 and my personal notes).

Weeks 10 and 11: Properties of MLE, Multidimensional Delta Method, Properties of MLE on Transformed Distributions (STAM Section 29).

Week 12: Hypothesis Testing (STAM Section 30), Graphical Methods for Model Selection and Tests (STAM Section 31).

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. The format of teaching and exams are the same as those of ACT451 from the last semester. 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 in that nature.

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 act452h1@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 Wednesday Feb 24 from 10:20am to 11:50am. A 2-hour final assessment will be given during the final assessment week. The exact date will be announced later. Like the quizzes, you must email your answers to act452h1@gmail.com in 10 minutes after the end of the test/assessment period.

Grading

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