

## ACT451H1F/STA2500 Loss Models Fall 2017

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Office hours: Wednesdays 10am-noon, 2pm-4pm or by appointment.  
Lecture times and locations: Tuesdays 11:10am-noon, Thursdays 10:10am-noon; Sidney Smith 2105.

### **Prerequisite:** STA257.

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>

Please submit a filled waiver form by Tuesday Sept 19, or you will be removed from the course on Wednesday Sept 20.

### **Required Textbook**

Broverman, S., ACTEX Study Manual for the SOA Exam C and CAS Exam 4, Fall 2015 or later Edition, Volume One.

The study manual has two volumes and is available at ACTEX Publications (<http://www.actexamdriver.com/>). Volume One will also be used for ACT452 in the Winter semester. Part of the second volume is for ACT466. I have posted the first 6 sections of the study manual on my website for you to download. Please purchase a copy of the study manual as soon as possible.

### **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. They are also 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 7. As the title of the study manual indicated, this course covers part of the SOA Exam C syllabus. The rest is covered in ACT452 and ACT466. I will also teach some topics that are not covered by the SOA Exam C but useful in insurance modelling.

### **Topics and Tentative Schedule**

Sept 7: review of key concepts and formulas in probability theory.

Week of Sept 10: parametric distributions; transformations.

Week of Sept 17: linear exponential family; hazard rate function.

Week of Sept 24: right tail behaviour, mean residual lifetime, risk measures (VaR and TVaR-

Section 21), applications to risk management.

Week of Oct 1: finite and continuous mixtures, insurance interpretation, distributional properties.

Week of Oct 8: spliced distributions, frailty models, Erlang-based univariate mixture models, properties, Tijm's approximation.

Week of Oct 15: EM algorithm, data-fitting examples. A midterm test will be given on Thursday Oct. 19 from 10:20am to 11:50pm (90 minutes) in class.

Week of Oct 22: policy limit, LER. other policy modifications, deductibles, stop-loss premium.

Week of Oct 29: co-pay, inflation adjustment, claim severity, claim frequency, zero-modified frequency distributions.

Week of Nov 5: Fall break. No class.

Week of Nov 12: the  $(a, b, 0)$  and  $(a, b, 1)$  classes.

Week of Nov 12: aggregate claims and compound distributions, recursive calculation. Week of Nov 26: Impact of individual policy modifications on the aggregate payments,

Dec 5: stop-loss insurance on aggregate claims, review topics in the final exam.

### Quizzes, Test and Exam

Five 10-minutes in-class pop quizzes will be given during the semester. There will be no make-up quizzes. The best four quizzes will be counted, 1.5% each, toward the final mark. There will be no homework but I will post practice problems from the study manual weekly on my teaching website. A 90 minutes midterm test will take place from 10:20am to 11:50am on Thursday October 19 in SS2105. The test accounts for 37% of the final mark. Should you be forced to miss the test, 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 individual oral makeup test.** A written-answer final exam (2 hours) will be given during the faculty exam period. The final exam accounts for 57% of the final mark.

### The Code of Behaviour on Academic Matters

Visit [www.artsci.utoronto.ca/osai/students](http://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.