Western Science

Department of
Statistical and Actuarial Sciences

Course outline

AS 3424b/AS 9424b Loss Models I
2017/2018

Instructor Information

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Course Information

Course Description:	Insurance loss frequency and severity models; aggregate loss models; risk measures; ruin theory; simulation.
Prerequistes:	SS3657A/B A minimum mark of 60% in Statistical Sciences 3657A/B. Restricted to students enrolled in any Actuarial Science module, or those registered in the Honours Specialization module in Statistics or the Honours Specialization in Financial Modelling module. A minimum mark of 60% in Statistical Sciences 3657a/b
Antirequistes:	The former Actuarial Science 4424A/B.
Pre-, Co-requisites:	Unless you have either the requisites for this course or written special permission from your Dean to enroll in it, you may be removed from this course and it will be deleted from your record. You can be deregistered at any time even after writing the final exam. This decision may not be appealed. You will receive no adjustment to your fees in the event that you are dropped from a course for failing to have the necessary prerequisites
Lecture Hours:	Mon., Wed., Fri. 9:30 a.m. – 10:30 a.m., WSC 240;

Book information

Textbook: Loss Models: From Data to Decisions, 4th edition by Klugmann, S.A., Panjer, H.H., and Willmot, G.E., John Wiley and Sons, Inc.

Course objectives

This course is intended to familiarize the student with a variety of techniques for the analysis of aggregate losses. Following the introductory Chapters 1 and 2 of the textbook, coverage will focus primarily on Chapters 3 through 9. More precisely, the following topicks are covered:

A. Severity models

1. Calculate the basic distributional quantiles:
   a) moments
   b) percentiles
   c) generating functions
2. Describe how changes in parameters affect the distribution.
3. Recognize classes of distributions and their relationships.
4. Apply the following techniques for creating new families of distributions:
   a) multiplication by a constant
   b) raising to a power
   c) exponentiation
   d) mixing
5. Identify the applications in which each distribution is used and reasons why.
6. Apply the distribution, given the parameters.
7. Calculate various measures of tail weight and interpret the results to compare the tail weights.

B. Frequency models

For the Poisson, mixed Poisson, binomial, negative binomial, geometric distribution and mixtures thereof:

1. Describe how changes in parameters affect the distribution.
2. Calculate moments.
3. Identify the applications for which each distribution is used and reasons why.

4. Apply the distribution, given the parameters.
5. Apply the zero-truncated and zero-modified distribution, given the parameters.

C. Aggregate models

1. Compute relevant parameters and statistics for collective risk models.
2. Evaluate compound models for aggregate claims.
3. Compute aggregate claims' distributions.

D. For severity, frequency and aggregate models:

1. Evaluate the impacts of coverage modifications:
   a) deductibles
   b) limits
   c) coinsurance
2. Calculate loss-elimination ratios.
3. Evaluate effects of inflation on loss.

E. Risk measures

1. Calculate VaR and TVaR and explain their use and limitations.

F. Continuous-time stochastic processes

1. The homogeneous Poisson Process
2. The non-homogeneous Poisson process
3. The compound Poisson process

Assessment

Assignments:	One case will be assigned and graded after covering Chapter 8. One assignment due at the last day of classes will be graded. In addition, some practice questions will be assigned to help understand the material. These questions are important in the preparation for the midterm tests and the final exam.
Midterm tests:	Two midterm tests will be given on February 7 and March 14, respectively.
Final exam:	A three-hour final exam is scheduled by the Registrar's Office during the regular exam session.

Evaluation

Undergraduate students will be evaluated on the basis of the case, the assignment, the two midterm tests and the final exam. The final mark will be based on weights of 5% for each of the case and the assignment, 20% for each of the midterm tests, and 50% for the final exam.

Graduate students will be evaluated on the basis of the case, two assignments, the two midterm tests and the final exam. The final mark will be based on weights of 5% for the case and 2.5% for each of the assignments, 20% for each of the midterm tests, and 50% for the final exam.

In order to obtain full credit or maximize partial credit on questions, students must outline clearly their approach, showing calculations when necessary.

Each week suggested practice questions will be posted on OWL website of the course. Assistance with solving them may be obtained during the instructor's office hours. If a student requires remarking of a test, the test must be submitted to the instructor within two weeks of the test date. Any changes made after this period will not be reflected in the recorded marks.

All students who have had a medical reason to miss a test must present a medical certificate. Otherwise, they will receive a mark of 0 for the test. There will not be a makeup test for such students; instead, the remaining mark will be adjusted accordingly based on the other test and the final exam.

Course website

No lecture notes will be posted online. However, some relevant readings, assigned practice questions, slides and announcements will be posted on the course OWL web page.

Calculators

A calculator is essential for working exercises, tests and final exam. There is no restriction on models of (non-programmable) calculators allowed for use in the course. It is, though, preferable for actuarial students to practice on SOA /CAS approved calculators.

CIA accreditation

This course is accredited under the Canadian Institute of Actuaries (CIA) University Accreditation Program (UAP) for the 2017-2018 academic year. Achievement of the established exemption grade in this course may qualify a student for exemptions from writ-

ing certain preliminary exams. Please note, a combination of courses may be required to achieve a single exemption. Please se the following link for full details: http://www.cia-ica.ca/membership/uap/information-for-students.

Missed tests or final exam

The policy of the department of Statistical and Actuarial Sciences is that there will be no make-up exams for a missed midterm. For those that do legitimately miss a midterm and provide the required supporting documentation, the standard practice will be that the weight of the midterm will be reassigned to the final exam. If your reason is not deemed valid, then you will receive a mark of 0.

If you miss the final exam, please contact your faculty's Academic Counselling Office as soon as you are able to do so. They will assess your eligibility to write the Special Exam (the name given by the university to a makeup final exam).

You may also be eligible to write the special exam if you are in a "Multiple Exam Situation" (see http://www.registrar.uwo.ca/examinations/exam_schedule.html).

Support services

Please contact the course instructor if you require lecture or printed material in an alternate format or if any other arrangements can make this course more accessible to you. You may also wish to contact Services for Students with Disabilities (SSD) at (519) 661-2111 ext. 82147 if you have questions regarding accommodation.

The policy on Accommodation for Students with Disabilities can be found here: www.uwo.ca/univsec/pdf/academic_policies/appeals/accommodation_disabilities.pdf

The policy on Accommodation for Religious Holidays can be found here: http://www.uwo.ca/univsec/pdf/academic_policies/appeals/accommodation_religious.pdf

E-mail communication

You are welcome to communicate with your instructor by e-mail, but e-mail communication should only be used to provide her with information or to ask a question that requires a brief response. The best means of learning material that you find challenging is to book an appointment or drop by during office hours. If you do e-mail me, please use your UWO account, as these are the preferred email addresses (as e-mails sent from other addresses often get spammed).

Attendance

Classroom attendance is viewed as an important part of the learning process. Students are advised that excessive absenteeism may result in the student being disbarred from the final exam (see Western Academic Calendar).

Academic policies

If you are unable to meet a course requirement due to illness or other serious circumstances, you must provide valid medical or supporting documentation to the Academic Counselling Office of your home faculty as soon as possible. If you are a Science student, the Academic Counselling Office of the Faculty of Science is located in WSC 140, and can be contacted at scibmsac@uwo.ca.

For further information, please consult the university's medical illness policy at http://www.uwo.ca/univsec/pdf/academic_policies/appeals/accommodation_medical.pdf.

The website for Registrarial Services is http://www.registrar.uwo.ca.

In accordance with policy, http://www.uwo.ca/its/identity/activatenonstudent.html, the centrally administered e-mail account provided to students will be considered the individual's official university e-mail address. It is the responsibility of the account holder to ensure that e-mail received from the University at his/her official university address is attended to in a timely manner.

Scholastic offences are taken seriously and students are directed to read the appropriate policy, specifically, the definition of what constitutes a Scholastic Offence, at this website: http://www.uwo.ca/univsec/pdf/academic_policies/appeals/scholastic_discipline_undergrad.pdf.