COURSE OUTLINES

AS3424 (9424) A/B – Short Term Actuarial Mathematics I
Fall 2019

Course Information

Course Description: Insurance loss frequency and severity models; aggregate loss models; risk measures; ruin theory.

Prerequisite Requirements

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.

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. 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 MWF 9:30 AM-10:30 AM at AHB-1B02;

Instructor Information

Instructor: Jiandong Ren
Office: WSC 219
Email: jren6@uwo.ca
Phone: 519-661-2111, Ext 88209
Office hours: Tue 2-3:30pm, Thu 2-3:30pm.
Course Materials

Textbook

Topics covered
This course introduces students the model-based approach to analyze insurance losses. Coverage will focus primarily on Chapters 1 - 6, 8 and 9, and if time permitted, Chapter 7 of the textbook. The following topics are covered:

A. Severity models

1. Calculate the basic distributional quantities: 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 and generating functions.
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 and individual risk models. 2. Evaluate compound models for aggregate claims. 3. Compute aggregate claims’ distributions.

D. Coverage Modifications

For severity, frequency and aggregate models:
1. Evaluate the impacts of coverage modifications: a) deductibles; b) limits; c) coinsurance.
2. Calculate loss elimination ratios (LER).
3. Evaluate effects of inflation on loss.

E. Risk Measures

1. Calculate VaR and TVaR and explain their use and limitations.
2. The desirable properties of a risk measure

F. Continuous-time ruin models

1. The (homogeneous) Poisson process
2. The classical risk model
3. The adjustment coefficient and Lundberg’s inequality

Course Website

OWL is Western University's online learning management system. Relevant readings, assigned practice questions, slides and announcements will be posted on the course OWL web page. It is the students’ responsibility to check the course owl site regularly.

Methods of Evaluation

Assignments

Some practice questions will be assigned in class to help students understand the material. These questions are important in the preparation for the midterms and the final exam.
Midterms or Tests

Two 50-minute midterm tests will be given, which will be held in class on January 31 and March 6 respectively.

Final Exam

The date and time for the 3-hour final exam will be announced by the registrar's office, usually near the first part of November. Students are required to wait until the final exam schedule is posted before making arrangements for travel over the Christmas period. Exams will NOT be moved to accommodate students who ignore this requirement.

The overall course grade will be calculated as listed below:

<table>
<thead>
<tr>
<th>Exam Type</th>
<th>Percentage</th>
</tr>
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<tbody>
<tr>
<td>Midterm Exam 1</td>
<td>20%</td>
</tr>
<tr>
<td>Midterm Exam 2</td>
<td>20%</td>
</tr>
<tr>
<td>Final Exam</td>
<td>60%</td>
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</tbody>
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Non-programmable calculators are allowed on the midterm tests and the final exam. However, SOA approved calculators are strongly recommended.

CIA Accreditation

This course is accredited under the Canadian Institute of Actuaries (CIA) University Accreditation Program (UAP). Achievement of the minimum required grades in accredited courses may provide credit for preliminary exams. Please note that a combination of courses may be required to achieve exam credit. Details of required courses and grades at Western University are available at:


In addition to the university’s internal policies on conduct, including academic misconduct, candidates pursuing credits for writing professional examinations shall also be subject to the Code of Conduct and Ethics for Candidates in the CIA Education System and the associated Policy on Conduct and Ethics for Candidates in the CIA Education System. For more information, please visit Obtaining UAP Credits and the CIA FAQ.
**Missed Midterm or Test:** 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.

**Accommodation and Accessibility**

If you are unable to meet a course requirement due to illness or other serious circumstances, you must seek approval for the absence as soon as possible. Approval can be granted either through a self-reporting of absence or via the Dean’s Office/Academic Counselling unit of your Home Faculty. If you are a Science student, the Academic Counselling Office of the Faculty of Science is located in NCB 280, and can be contacted at scibmsac@uwo.ca.

For further information, please consult the university’s policy on academic consideration for student absences: https://www.uwo.ca/univsec/pdf/academic_policies/appeals/Academic_Consideration_for_absences.pdf.

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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).
Academic Policies

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

7.1 UWO email account
In accordance with policy, http://www.uwo.ca/its/identity/activatennonstudent.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.

7.2 Scholastic offences
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.

7.3 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).

7.4 Classroom Environment
The Department has adopted a "Mutual Expectations" policy governing the classroom environment and all work submitted by students. The full text of the policy can be found at: http://www.stats.uwo.ca/mutual_expectations.pdf.

In summary, the policy was developed under the premise that all interactions between students and faculty should be governed by the principles of courtesy, respect and honesty.

7.5 Conduct and Ethics for Candidates in the CIA Education System.

In addition to the university’s internal policies on conduct, including academic misconduct, candidates pursuing credits for writing professional examinations shall also be subject to the Code of Conduct and Ethics for Candidates in the CIA Education System and the associated Policy on Conduct and Ethics for Candidates in the CIA Education System. For more information, please visit Obtaining UAP Credits and the CIA FAQ.
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 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

Learning-skills counsellors at the Student Development Centre (http://www.sdc.uwo.ca) are ready to help you improve your learning skills. They offer presentations on strategies for improving time management, multiple-choice exam preparation/writing, textbook reading, and more. Individual support is offered throughout the Fall/Winter terms in the drop-in Learning Help Centre, and year-round through individual counselling.

Students who are in emotional/mental distress should refer to Mental Health@Western (http://www.health.uwo.ca/mental_health) for a complete list of options about how to obtain help.

Additional student-run support services are offered by the USC, http://westernusc.ca/services.

Students must use their Western (@uwo.ca) email addresses when contacting their instructors. Email communication should only be used to provide them with information or to ask a question that requires a brief response. For more lengthy discussions and for discussions on lectures/course material please see your instructor during their scheduled office hours or by appointment. If you do email them, please use your UWO account, as these are often the only emails read (as emails sent from other addresses often get spammed).