

AS9824A Course Outline

1. Course Information

Title: Short-term Actuarial Mathematics II

Lecture hours: Tuesday 10:30 am-11:30 am; Thursday 10:30 am-12:30 pm

This course will be offered in person at WSC 240

Office hours: Tuesdays 12:30 pm-2:00 pm, Thursdays 9:00-10:20 am.

Classes Start	Reading Week	Classes End	Study day(s)	Exam Period
Sept 5	Oct 12 – Oct 20	Dec 6	Dec 7-8	Dec 9 - 22

Sept 13: Last day to add a full course or a first-term half course or drop a course without showing WDN

December 2: Last day to withdraw from a first-term half course or full-year course without academic penalty (extended from Sat. Nov. 30)

Course Description: Pricing and Reserving for Short-Term Insurance Coverages, Selection, calibration, and validation of parametric models for insurance losses; credibility theory.

This course covers part of the materials required by SOA's FAM and ASTAM exams.

List of Prerequisites

SS3858A/B A minimum mark of 60% in Statistical Sciences 3858A/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.

2. Instructor Information

Instructors	Email	Office	Phone	Office Hours
Dr. Jiandong Ren	Jren6@uwo.ca	WSC219	88209	Tue, Fri 12:30-2pm

Students must use their Western (@uwo.ca) email addresses when contacting their instructors.

3. University Accreditation Program – Canadian Institute of Actuaries (CIA)

The CIA accreditation program will not apply to Graduate programs in Western. If you plan to become a fully qualified actuary, then you will need to continue to write and pass the preliminary exams of the SOA. Please see the following link for full details:

<https://www.cia-ica.ca/starting-your-journey/actuarial-education-in-canada/>

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.

<https://www.cia-ica.ca/publications/223159e/>

5. Course Materials

Textbooks

- Klugman, S.A., Panjer, H.H. and Willmot, G.E. (2019). Loss Models: From Data to Decisions, 5th edition, Wiley.
- Brown and Lennox (2022), Introduction to Ratemaking and Loss Reserving for Property and Casualty Insurance (5th Edition), ACTEX

Reference books

- Hardy, M.R (2022) ASTAM-21-23: [Outstanding Claims Reserves](#)
- Edward (Jed) Frees: [Loss Data Analytics](#)
- Other publicly available resources that will be posted on Western OWL Brightspace.

Topics covered:

Chapters 2-5 of Textbook (2) and Chapters 10-13 and 15-19 of the textbook (1). Specific topics are:

A. Introduction to Short-Term Insurance

1. Short-Term Insurance Coverages
2. Loss Reserving
3. Ratemaking
4. Reinsurance

B. Construction and Selection of Parametric Models

1. Estimate the parameters of failure time and loss distributions using:
 - a) Maximum likelihood
 - b) Bayesian procedures
2. Estimate the variance of estimators and the confidence intervals for the parameters and functions of parameters of failure time and loss distributions.
3. Determine the acceptability of a fitted model and/or compare models using:
 - a) Graphical procedures
 - b) Kolmogorov-Smirnov test
 - c) Anderson-Darling test
 - d) Chi-square goodness-of-fit test

- e) Likelihood ratio test
- f) Schwarz Bayesian Criterion

C. Credibility

1. Apply limited fluctuation (classical) credibility, including full and partial credibility criteria.
2. Perform Bayesian analysis using both discrete and continuous models.
3. Apply Bühlmann and Bühlmann-Straub models and understand the relationship of these to the Bayesian model.
4. Apply conjugate priors in Bayesian analysis and in particular the Poisson-gamma model.
5. Apply empirical Bayesian methods in the nonparametric and semiparametric cases.

Course Website

All course material will be posted to OWL: <https://westernu.brightspace.com/>

Students are responsible for checking the course OWL site (<https://westernu.brightspace.com/>) regularly for news and updates. This is the primary method by which information will be disseminated to all students in the class.

If students need assistance with the course OWL site, they can seek support on the [OWL Brightspace Help](#) page. Alternatively, they can contact the Western Technology Services Helpdesk. They can be contacted by phone at 519-661-3800 or ext. 83800.

Technical Requirements

- Students need access to Microsoft Excel and R programming language.
- SOA-approved non-programmable calculators are required for the midterm tests and the final exam.

5. 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.

Loss Reserving/ Pricing Project

For this project, students are required to implement several approaches for loss reserving and risk classification. It will be assigned on October 1. A project report should be submitted before October 8. The report will be marked and counts for 5% of the course grade.

Simulation Project

This project counts for 5% of the course grade and will be assigned towards the end of the semester. Students are required to simulate a risk process and compute the relevant risk measures. Students can also choose their own project topic upon approval of the instructor.

Midterms or Tests

Two midterm tests will be given on **October 8** and **November 7**, respectively, during regular class time. The first midterm is 50 minutes long, and the second is 110 minutes. The midterm tests and the final are all cumulative.

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 planning for travel over the Christmas period. Exams will NOT be moved to accommodate students who ignore this requirement.

Both the midterm and the final exams are closed books. The overall course grade will be calculated as listed below:

Midterm Exam 1	15%
Midterm Exam 2	25%
Loss Reserving/ Pricing Project	5%
Simulation Project	5%
Final Exam	50%

Non-programmable calculators are allowed on the midterm tests and the final exam. However, SOA-approved calculators are strongly recommended.

General information about missed coursework

You must provide valid documentation for medical-related absences or adequate supporting documentation for non-medical absences.

For medical-related absences, you must provide a Student Medical Certificate (SMC) signed by a licensed medical or mental health professional. The SMC is available online at

https://www.uwo.ca/univsec/pdf/academic_policies/appeals/medicalform.pdf

Note that in all cases, graduate students are required to contact their instructors within 24 hours of the end of the period covered by such documentation to request accommodation.

Evaluation Scheme for Missed Assessments

There will be no make-up exams for a missed midterm. For those who do legitimately miss a midterm and provide the required supporting documentation, the standard practice will be that the weight of the missed 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 and your Academic Consideration has been granted, you will be allowed to write the Special Examination (the name given by the University to a makeup Final Exam). See the Academic Calendar for details (under [Special Examinations](#)), especially for those who miss multiple final exams within one examination period.

Additional Statements

Religious Accommodation

When conflicts with a religious holiday that requires an absence from the University or prohibits certain activities, students should request an accommodation for their absence in writing to the course instructor and/or the Academic Advising office of their Faculty of Registration. This notice should be made as early as possible but not later than two weeks prior to the writing or the examination (or one week prior to the writing of the test).

Please visit the Diversity Calendars posted on our university's EDID website for the recognized religious holidays:

<https://www.edi.uwo.ca>.

Accommodation Policies

Students with disabilities are encouraged to contact Accessible Education, which provides recommendations for accommodation based on medical documentation or psychological and cognitive testing. The policy on Academic Accommodation for Students with Disabilities can be found at:

[https://www.uwo.ca/univsec/pdf/academic_policies/appeals/Academic Accommodation disabilities.pdf](https://www.uwo.ca/univsec/pdf/academic_policies/appeals/Academic_Accommodation_disabilities.pdf).

Academic Policies

The website for Registrar Services is <https://www.registrar.uwo.ca/>.

In accordance with policy,

https://www.uwo.ca/univsec/pdf/policies_procedures/section1/mapp113.pdf,

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 their official university address is attended to in a timely manner.

Scholastic offenses are taken seriously and students are directed to read the appropriate policy, specifically, the definition of what constitutes a Scholastic Offence, at the following Web site:

https://www.uwo.ca/univsec/pdf/academic_policies/appeals/scholastic_discipline_undergrad.pdf.

Support Services

Please visit the Science & Basic Medical Sciences Academic Advising webpage for information on adding/dropping courses, academic considerations for absences, appeals, exam conflicts, and many other academic-related matters: <https://www.uwo.ca/sci/counselling/>.

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

Western is committed to reducing incidents of gender-based and sexual violence and providing compassionate support to anyone who has gone through these traumatic events. If you have experienced sexual or gender-based violence (either recently or in the past), you will find information about support services for survivors, including emergency contacts at

https://www.uwo.ca/health/student_support/survivor_support/get-help.html.

To connect with a case manager or set up an appointment, please contact support@uwo.ca.

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 Accessible Education at

http://academicsupport.uwo.ca/accessible_education/index.html

if you have any questions regarding accommodations.

Learning-skills counsellors at Learning Development and Success (<https://learning.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.

Western University is committed to a thriving campus as we deliver our courses in the mixed model of both virtual and face-to-face formats. We encourage you to check out the Digital Student Experience website to manage your academics and well-being: <https://www.uwo.ca/se/digital/>.

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