

## **Regression (SS3859A/SS9859A) Course Outline (Fall 2022)**

### **1. Course Information**

#### **Course Information**

Course Name: Regression (SS3859A/SS9859A)

Lecture Hours: Monday, Wednesday, Friday 1:30 – 2:30 PM (NSC-7)

Tutorial Hours: Monday 2:30 – 3:30 PM

(Note: Tutorial hours will be used for two midterm tests.)

#### **List of Prerequisites**

A minimum mark of 60% in Statistical Sciences 2858A/B. Pre- or Corequisite(s): Statistical Sciences 2864A/B.

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**

<b>Instructors</b>	<b>Email</b>	<b>Office</b>	<b>Phone</b>	<b>Office Hours</b>
Dr. Hyukjun (Jay) Gweon (Course Coordinator)	<a href="mailto:hgweon@uwo.ca">hgweon@uwo.ca</a>	WSC 211	519-661-2111 x87792	TBA
TA:				
TA:				

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

### 3. Course Syllabus, Schedule, Delivery Mode

Simple and Multiple linear regression models and their use to model data using computing including model specification and assumptions, inference and estimation, use of indicator variables, regression diagnostics, model building and selection. Introduction to forecasting and time series.

Upon successful completion of this course, students will be able to:

- Demonstrate understanding of the key concepts of linear regression.
- Use R for the statistical methods and data analysis covered in this course.
- Build and evaluate regression models and apply remedial measures as needed.
- Interpret and discuss the analysis results in a broader scientific context.

Lecture Hours: Monday, Wednesday, Friday 1:30 – 2:30 PM (NSC-7)

Tutorial Hours: Monday 2:30 – 3:30 PM

All lectures are delivered in person.

Below is the tentative weekly schedule.

<b>Week</b>	<b>Topic</b>
1	Basics of R, Review of hypothesis testing
2	SRS - LS estimation, MLE, Decomposition of Variation
3	Sampling Distribution, CI and PI for beta Testing, MLR – estimation
4	MLR – Inference, Nested model
5	Categorical Variables, Interaction
6	Thanksgiving, Model diagnostics
7	Unusual points – Outlier, Leverage, Influence Transformation
8	Transformation, Collinearity Variable selection - Measures
9	Reading Week
10	Variable selection algorithms Shrinkage methods
11	Logistic regression – estimation, inference, prediction
12	Logistic regression Other classification methods Regression for time series data
13	Regression for time series data Random Walk AR(1), smoothing
14	Trend, Seasonality Summary

## Contingency plan for an in-person class pivoting to 100% online learning

In the event of a COVID-19 resurgence during the course that necessitates the course delivery moving away from face-to-face interaction, affected course content will be delivered entirely online, either synchronously (i.e., at the times indicated in the timetable) or asynchronously (e.g., posted on OWL for students to view at their convenience). The grading scheme will **not** change. Any remaining assessments will also be conducted online as determined by the course instructor.

## 4. Course Materials

The instructor will use his own course notes and R examples.

Textbooks (recommended, **not required**):

- (a) Introduction to Regression Modeling by B. Abraham and J. Ledolter
  - (b) Regression Modeling with Actuarial and Financial Applications by Jed Frees
- Or any other regression textbook will be helpful as well.

Software: We will use **R** for this course. Laptop or personal computer with R/RStudio installed is required.

Students are responsible for checking the course OWL site (<http://owl.uwo.ca>) on a regular basis for news and updates. This is the primary method by which information will be disseminated to all students in the class.

All R codes that we use in class will be posted to OWL: <http://owl.uwo.ca>.

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

## 5. Methods of Evaluation

The overall course grade will be calculated as listed below:

SS3959A	SS9859A
Assignments 20% Midterm Tests 40% Final Exam 40%	Assignments 20% Midterm tests 30% Data analysis project 20% Final Exam 30%

### Assignments

There will be **four homework assignments (each is worth 5%)** during the course (**Due dates: Sep 25<sup>th</sup>, Oct 16<sup>th</sup>, Nov 6<sup>th</sup>, Dec 4<sup>th</sup>**). You will be asked to use R to solve most of homework problems. You are required to submit all R codes with the answers.

## Midterm Tests

There will be **two written midterm tests** that cover the course material. The dates of the tests are **Oct 3<sup>rd</sup> (Midterm 1) and Nov 14<sup>th</sup> (Midterm 2)**. Each midterm test will be worth 20% (SS3859A) or 15% (SS9859A) of your final grade. The topics covered for each test will be announced later.

## Data Analysis Project (SS9859A students only)

The project will consist of a group data analysis (at most two students in each group). Students are required to use R for the regression analysis and submit a project report. Detailed instructions will be announced later.

## Final Exam

The date of the final exam will be set by the university.

## Notes

- All tests are closed book.
- In assignments and tests, there may be additional questions for SS9859A students.

## Accommodated Evaluations

- Late assessments will be subject to a late penalty of 20%/day, and assessments that are submitted 5 or more days late will not be graded. The weight for a missed assignment is not transferrable.
- **There are no make-up exams for midterms. The weight of a missed midterm exam (with a valid academic consideration, See section 6) will be transferred to the final exam. The student must contact the instructor to confirm any weight transfer. A weight transfer will only be made with an approval from the Academic Counselling Office AND the confirmation from the instructor.**

## Rounding of Marks Statement

Across the Sciences Undergraduate Education programs, we strive to maintain high standards that reflect the effort that both students and faculty put into the teaching and learning experience during this course. All students will be treated equally and evaluated based only on their actual achievement. Final grades on this course, irrespective of the number of decimal places used in marking individual assignments and tests, will be calculated to one decimal place and rounded to the nearest integer, e.g., 74.4 becomes 74, and 74.5 becomes 75. Marks WILL NOT be bumped to the next grade or GPA, e.g. a 79 will NOT be bumped up to an 80, an 84 WILL NOT be bumped up to an 85, etc. The mark attained is the mark you achieved, and the mark assigned; requests for mark “bumping” will be denied.

## 6. Student Absences

If you are unable to meet a course requirement due to illness or other serious circumstances, please follow the procedures below.

**Assessments worth less than 10% of the overall course grade:**

If you fail to meet the deadline of an assignment due to a legitimate reason (**to be determined by academic counsellors**), you must contact the instructor within 24 hours of the assignment deadline. A one-day extension may be given with the instructor's approval.

**Assessments worth 10% or more of the overall course grade:**

For work totalling 10% or more of the final course grade, you must provide valid medical or supporting documentation to the Academic Counselling Office of your Faculty of Registration as soon as possible. For further information, please consult the University's medical illness policy at

[https://www.uwo.ca/univsec/pdf/academic\\_policies/appeals/accommodation\\_medical.pdf](https://www.uwo.ca/univsec/pdf/academic_policies/appeals/accommodation_medical.pdf).

The Student Medical Certificate is available at

[https://www.uwo.ca/univsec/pdf/academic\\_policies/appeals/medicalform.pdf](https://www.uwo.ca/univsec/pdf/academic_policies/appeals/medicalform.pdf).

**Absences from Final Examinations**

If you miss the Final Exam, please contact the Academic Counselling office of your Faculty of Registration as soon as you are able to do so. They will assess your eligibility to write the Special Examination (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" (e.g., more than 2 exams in 23-hour period, more than 3 exams in a 47-hour period).

**Note:** missed work can *only* be excused through one of the mechanisms above. Being asked not to attend an in-person course requirement due to potential COVID-19 symptoms is **not** sufficient on its own.

## **7. University Accreditation Program – Canadian Institute of Actuaries (CIA)**

### **Honours Specialization Program in Actuarial Science**

If you are in 2<sup>nd</sup> or 3<sup>rd</sup> year

If you graduate from with an HSP in Actuarial Science, this course will be one of the courses that you will take in your program that will allow you to be exempt from the preliminary exams of the Society of Actuaries (SOA). This is under the new CIA program accreditation program. If your plan is to become a fully qualified actuary working in Canada, then all you would need to do is graduate from your HSP in actuarial science. You would then be eligible for the CIA Capstone Exam. Taking and passing this exam, along with an online module and a practice education course, would make you eligible to become an ACIA (associate of the Canadian Institute of Actuaries).

If you are in 4<sup>th</sup> year

This course is accredited under the Canadian Institute of Actuaries (CIA) University Course Accreditation Program (UAP) for the 2022-23 academic year. Achievement of the established exemption grade in this course may qualify a student from exemptions from writing certain preliminary exams. This is the last year of the CIA course accreditation program.

## Major in Actuarial Science

If you are a student in a major in Actuarial Science, the CIA program accreditation program will not apply to you. If your plan is to become a fully qualified actuary, you will need to continue to write and pass the preliminary exams of the SOA. However, for 2022-23 this course is still accredited under the Canadian Institute of Actuaries (CIA) University Course Accreditation Program (UAP) for the 2022-23 academic year. Achievement of the established exemption grade in this course may qualify a student from exemptions from writing certain preliminary exams. **This is the last year of the CIA course accreditation program.**

Please see the following link for full details:

<http://www.cia-ica.ca/membership/university-accreditation-program--home>

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**.

<https://www.cia-ica.ca/docs/default-source/2020/220065e.pdf>

## 8. Accommodation and Accessibility

### Religious Accommodation

When a course requirement conflicts with a religious holiday that requires an absence from the University or prohibits certain activities, students should request accommodation for their absence in writing at least two weeks prior to the holiday to the course instructor and/or the Academic Counselling office of their Faculty of Registration. Please consult University's list of recognized religious holidays (updated annually) at

<https://multiculturalcalendar.com/ecal/index.php?s=c-univwo>.

### 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).

## 9. Academic Policies

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

In accordance with policy,

[https://www.uwo.ca/univsec/pdf/policies\\_procedures/section1/mapp113.pdf](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.

For all exams, students are allowed to use non-programmable calculators.

**Scholastic offences** 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:

[http://www.uwo.ca/univsec/pdf/academic\\_policies/appeals/scholastic\\_discipline\\_undergrad.pdf](http://www.uwo.ca/univsec/pdf/academic_policies/appeals/scholastic_discipline_undergrad.pdf).

## 10. Support Services

Please visit the Science & Basic Medical Sciences Academic Counselling 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](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](mailto: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](http://academicsupport.uwo.ca/accessible_education/index.html)

if you have any questions regarding accommodations.