

## SS3859A/9859A Regression Course Outline

### 1. Course Information

#### Course Information

Course Name: Regression (SS3859A/9859A)

Academic Term: Fall 2023

Lecture Hours: Monday, Wednesday, Friday 1:30 – 2:30 PM

Tutorial Hours: Monday 2:30 – 3:30 PM

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

Lecture Location: PAB 106

#### List of Prerequisites

Prerequisite(s): 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's Designate (Department/Program Counsellors and Science Academic Counselling) 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. Hyukjun (Jay) Gweon	<a href="mailto:hgweon@uwo.ca">hgweon@uwo.ca</a>	WSC 211	519-661-2111 ext.87792	Wed 10:00 – 11:00 AM (in-person)
TA: TBA				
TA: TBA				

Students must use their Western (@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 (PAB - 106)

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	Multinomial logistic regression Classification model assessment
13	Regression for time series data Random Walk Autoregressive models, smoothing
14	Trend, Seasonality Summary

## Key Sessional Dates

Classes begin: September 7

Fall Reading Week: October 30 – November 5

Classes end: December 8

Exam period: December 10 – 22

## Other Important Dates (**no class**)

Canada life day: September 18

Non-instructional day: September 29

## Contingency plan

Although the intent is for this course to be delivered in person, should any university-declared emergency require some or all of the course to be delivered online, either synchronously or asynchronously, the course will adapt accordingly. The grading scheme will **not** change. Any assessments affected will 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**):

Introduction to Regression Modeling by B. Abraham and J. Ledolter

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:

Assignments (2)	10%
Midterm Tests (2)	30%
Group Project	20%
Final Exam	40%

## Assignments

There will be **two homework assignments (each is worth 5%)** during the course (**Due dates: Oct 6<sup>th</sup>, Nov 19<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 in-person midterm tests** that cover the course material. The dates of the tests are **Oct 16<sup>th</sup> (Midterm 1) and Nov 27<sup>th</sup> (Midterm 2)**. Each midterm test will be worth 15% of your final grade. The topics covered for each test will be announced later.

## Group Project

The project will consist of a group data analysis (at most three (SS3859A) or two (SS9859A) 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.
- Late assessments with valid document(s) should be completed no later than 48 hours from the scheduled deadlines. Late assessments without any valid document will not be accepted.
- The weight for a missed assignment is not transferrable.

# 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 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).

**There are no make-up tests for missed midterm tests. The weight of a missed test with a valid academic consideration will be transferred to the final exam. The student must contact the instructor to confirm the weight transfer. A weight transfer will only be made with an approval from the Academic Counselling Office AND the confirmation from the instructor.**

## **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).

If a student fails to write a scheduled Special Examination, the date of the next Special Examination (if granted) normally will be the scheduled date for the final exam the next time this course is offered. The maximum course load for that term will be reduced by the credit of the course(s) for which the final examination has been deferred. See the Academic Calendar for details (under [Special Examinations](#)).

**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)**

This course is part of the University Accreditation Program meeting certain requirements by the Canadian Institute of Actuaries. Please consult the CIA website (<https://www.cia-ica.ca/membership/university-accreditation-program-home>) for full details on CIA accreditation.

## **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.

**A non-programmable calculator is permitted on tests and exams. All other electronic devices will not be permitted.**

**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).

[If Remote Proctoring Software may be used in this course, including in the event of health lock-down] Tests and examinations in this course will be conducted using a remote proctoring service. By taking this course, you are consenting to the use of this software and acknowledge that you will be required to provide **personal information** (including some biometric data) and the session will be **recorded**. Completion of this course will require you to have a reliable internet connection and a device that meets the technical requirements for this service. More information about this remote proctoring service, including technical requirements, is available on Western's Remote Proctoring website at:

<https://remoteproctoring.uwo.ca>.

## 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.

Learning-skills counsellors at the Student Development Centre (<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/>.