** Department of Statistical and Actuarial Sciences**

 **SS9055B Generalized Linear Models**

**Course Outline**

**1. Course Information**

**Course Information**

Academic Term: Winter 2025

Lecture Hours: Monday, Wednesday 10:00 – 11:30 AM

Lecture Location: WSC 256

**List of Prerequisites**

You must have completed SS9859A or an equivalent course. Please contact the instructor if you have any concerns about prerequisites.

Unless you have either the requisites for this course or written special permission from your Dean’s Designate (Department/Program Counsellors and Science Academic Advisors) 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**

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| --- | --- | --- | --- | --- |
| **Instructors** | **Email** | **Office** | **Phone** | **Office Hours** |
| Dr. Hyukjun (Jay) Gweon | hgweon@uwo.ca | WSC211 | 519-661-2111 ext.87792 | TBA |

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

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

This course on generalized linear models (GLM) blends theoretical insights with practical applications, emphasizing the unifying principles that connect a variety of statistical procedures. Starting with inference techniques such as parameter estimation, hypothesis testing, goodness-of-fit assessment, and model comparison, we'll cover the theory and application of GLMs, focusing on binary, categorical, and count data while also covering the full generality of responses from the exponential family. Throughout the course, we will use R to interpret and report results, focusing on GLM types like logistic regression, Poisson log-linear models, and multinomial regression. The course is designed for students interested in advanced regression modeling, aiming to equip them with an understanding of statistical theory and the skills to fit regression models across various contexts.

Below is the tentative weekly schedule.

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| **Week** | **Topic** |
| 1 | Review of linear regression |
| 2 | Likelihood methods: parameter estimation |
| 3 | Likelihood methods: inferences |
| 4 | Likelihood for GLMs |
| 5 | Estimation and model assessment for GLMs |
| 6 | Test 1 |
| 7 | Reading Week  |
| 8 | Logistic regression for binary outcomes |
| 9 | Logistic regression for multinomial outcomes |
| 10 | Logistic regression, Log-linear models/Poisson GLMs |
| 11 | Log-linear models/Poisson GLMs |
| 12 | Poisson overdispersion |
| 13 | Test 2 |

Key Sessional Dates

Classes begin: January 6, 2025

Spring Reading Week: February 17 – 21, 2025

Classes end: April 4, 2025

**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 examples.

Course notes will be heavily based on the following two books (**highly recommended**):

1. Faraway, JJ (2016) Extending the Linear Model with R: Generalized Linear, Mixed Effects and Nonparametric Regression Models, 2nd Edition. CRC Press.

2. Dobson, AJ and Barnett, A (2008) An Introduction to Generalized Linear Models, 3rd Edition. CRC Press.

Software: We will use **R** for covering examples. A laptop or personal computer with R/RStudio installed is recommended.

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

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](https://brightspacehelp.uwo.ca/) 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) 20%

Tests (2) 50%

Final project 30%

**Assignments**

There will be **two homework assignments (each is worth 10%)** during the course.

**Tests**

There will be **two in-class written tests** that cover the course material. **The test dates are Feb 12 and Apr 2. Each test will be worth 25% of your final grade.** The topics covered for each test will be announced later.

**Final Project**

The project will be conducted individually. Students are required to use R for the data analysis and submit a project report. Detailed instructions will be posted later.

**Specific conditions** that are required to pass the course:

* Students are required to have completed at least two midterm exams. Students who do not meet this requirement may be given an opportunity to complete the requirement with the next offering of the course.

**6. Student Absences**

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

For work totalling 10% or more of the final course grade, you must provide valid medical or supporting documentation to the Academic Advising 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/academic_consideration.pdf>.

The Student Medical Certificate is available at

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

**Evaluation Scheme for Missed Assessments**

**Make-up test: Students who legitimately miss a test with a valid academic consideration are required to take a make-up test during the final exam period (the date will be determined later). If the Academic Consideration is not granted, then you will receive a mark of 0 for the missed test.**

**7. 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 an accommodation for their absence in writing at least two weeks prior to the holiday to the course instructor and/or the Academic Advising office of their Faculty of Registration. Please visit the Diversity Calendars posted on our university’s EDID website for the recognized religious holidays:

[https://www.edi.uwo.ca](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%20Accommodation_disabilities.pdf).

**8. Academic Policies**

The website for Registrarial 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.

**Calculators: Only non-programmable calculators are permitted on exams.**

**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:

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

**9. 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.