**Department of Statistical and Actuarial Sciences**

**STATS 3860B Generalized Linear Models**

**Winter 2025 Course Outline**

**1. Course Information**

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| **Day/Time** | **Location** |
| Tuesday: 9:30 am – 11:30 amWednesday: 10:30 am – 11:30 am  | **NCB-117** |

**Prerequisites for SS 3860B:** SS 3859A/B with at least 60%

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. Camila de Souza | **camila.souza@uwo.ca**\*Email subject must start with **Stats3860\*** | WSC-225 | 519-661-2111 Ext. 83618 | TBD |
| TA(s) TBD | TBD | TBD |  | TBD |

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|  Warning |
| Students must use their Western (@uwo.ca) email addresses when contacting the instructor and TAs.  **\***Messages sent without **Stats3860** at the beginning of their subject will **NOT** be replied.\* |

You can expect a response to a message to the instructor within **approximately 48 hours** during the work week (during busy times, it may take a little longer). ***Note that messages will not be answered within the 24-hour period before exams or project deadlines***, nor can I guarantee responses over weekends/holidays.

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

 **Course description**

In this course, we will use the R statistical software to study both applied and theoretical aspects of different extensions to the linear regression model framework. Course topics include logistic regression, Poisson log-linear models, contingency tables, multinomial regression, mixed effect models, and nonparametric regression.

**Course Objectives**

By the end of this course, you should be able to:

* Select an appropriate statistical method for analyzing data with a continuous, count, binomial, or multinomial response variable.
* Explain maximum likelihood inference for the generalized linear model framework.
* Conduct different analyses in R, including computing parameter estimates and confidence intervals, conducting hypothesis tests, selecting variables, comparing competing models, and assessing goodness of fit.
* Summarize and report your results for statistical and general audiences.

**Tentative Course Schedule - Textbook:** Extending the Linear Model with R, 2nd Edition

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| **Week** | **Topics** | **Reminders** |
| 1 | Jan 6-10  | * Review of Linear Regression (Ch. 1)
* Review of the Principle of Maximum Likelihood
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| 2 | Jan 13-17 | * Logistic Regression (Ch. 2)
* Binomial Regression (Ch. 3)
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| 3 | Jan 20-24 | * Poisson Regression (Ch. 5)
 | **Jan 24 Assignment 1** |
| 4 | Jan 27-31 | * Poisson Regression (Ch. 5)
* Two-way contingency tables (Ch. 6)
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| 5 | Feb 3-7  | * Three-way contingency tables (Ch. 6)
 | **Midterm Exam I** tentatively scheduled for Feb 5, 6:30 pm to 8:30 pm |
| 6 | Feb 10-14 | * Multinomial logit model (Ch. 7)
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| 7 | Feb 17-21  | **Reading week** |
| 8 | Feb 24-28 | * Generalized linear models (Ch. 8)
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| 9 | Mar 3-7 | * Generalized linear models (Ch. 8)
* Random effects (Ch. 10)
 | * **March 7 Assignment 2**
* **Extra 2-hour lecture on March 5, 6:30 pm to 8:30 pm, location TBD.** This is to cover for the week instructor will be away.
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| 10 | Mar 10-14 | **No classes because instructor will be away attending a research conference** |
| 11 | Mar 17-21 | - Random effects (Ch. 10)- Longitudinal data (Ch. 11) | * **Extra 1-hour lecture on March 17, 6:30 pm to 7:30 pm, location TBD.** This is to cover for the week instructor will be away.

**Midterm Exam II** tentatively scheduled for March 19, 6:30 pm to 8:30 pm  |
| 12 | Mar 24-28 | * Repeated measures (Ch. 11)
* Nonparametric Regression (Ch. 14)
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| 13 | Mar 31-April 4 | * Nonparametric Regression (Ch. 14)
 | **April 4 Assignment 3**  |

**Key Sessional Dates**

Classes begin: January 6, 2025

Spring Reading Week: February 15 – 23, 2025

Classes end: April 4, 2025

Exam period: April 7 – 30, 2025

**4. Course Materials**

* **Required text:** Faraway, J. J. (2016) Extending the Linear Model with R: Generalized Linear, Mixed Effects and Nonparametric Regression Models, 2nd Edition. CRC Press. Information about the textbook cost can be found [here](https://www.routledge.com/Extending-the-Linear-Model-with-R-Generalized-Linear-Mixed-Effects-and/Faraway/p/book/9781498720960?utm_source=author&utm_medium=shared_link&utm_campaign=B043141_jm1_5ll_6rm_t081_1al_julianfarawayauthorshare). Book resources are available at the author’s webpage: <https://julianfaraway.github.io/faraway/ELM/>

***Note:*** Students need access to the second edition, the first edition will not be sufficient.

* **Additional (non-required) text**: Roback, P., & Legler, J. (2021). Beyond multiple linear regression: applied generalized linear models and multilevel models in R. CRC Press. <https://bookdown.org/roback/bookdown-BeyondMLR/>
* **R statistical software package:** This course is heavily based on R; therefore, all assignments will require **coding in R using Rmarkdown or Quarto**. Please ensure the latest R and R studio are installed on our computer (<https://posit.co/download/rstudio-desktop/>).
* Clickers, specifically **iClicker**, may be used for instant feedback and non-graded assessments during classes. Clickers will not be used for any marks towards the course.
* All course material will be posted to OWL: <https://westernu.brightspace.com/>
* Students are responsible for regularly checking the course OWL site (<https://westernu.brightspace.com/>) 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**

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| **Component** | **Weight** | **Deadlines/Due dates** |
| **Assignment 1** | 5% | Friday, January 24 |
| **Assignment 2** | 7.5% | Friday, March 7 |
| **Assignment 3** | 7.5% | Friday, April 4 |
| **Midterm I (2 hrs)** | 15% | Tentatively scheduled for Feb 5, 6:30 pm to 8:30 pmTo be confirmed by the Registrar’s Office |
| **Midterm II (cumulative, 2 hrs)** | 25% | Tentatively scheduled for March 19, 6:30 pm to 8:30 pm To be confirmed by the Registrar’s Office |
| **Final exam (cumulative, 3 hrs)** | 40% | To be scheduled by the Registrar’s Office |

**Assignments**

* **Assignments will be available on the course OWL site. However, you will not submit your solutions to OWL. Instead, assignments must be submitted through Gradescope**,an online collaborative grading system – there will be a link to Gradescope on our OWL course site. You are responsible for ensuring that your assignment is successfully uploaded and legible. Submissions that the grader cannot read will receive a grade of zero. Assignment questions must be properly assigned to each page, or the submission will not be graded.
* After receiving the grades from an assignment, **students will have seven days to submit any regrade requests on that assignment**, except for **the final assignment**. After this seven-day period, regrade requests will NOT be accepted. Regrade requests must be made using the Gradescope tool “Regrade Request.”
* **Assignment submissions are due 11:55 pm (Eastern Time) on their due date**.
* **Deadline with a No-Late-Penalty Period:** Students are expected to submit each of the three assignments by the deadline listed. Should extenuating circumstances arise, students do not need to request Academic Consideration, and they are permitted to submit their assignment up to 48 hours past the deadline without a late penalty. **No extensions will be given beyond 48 hours, and submissions will no longer be accepted beyond 48 hours.**
* Solutions to assignments **will not** be posted; however, TAs will provide comments on incorrect answers using Gradescope, which will allow students to find out the correct solutions. In addition, students can ask the instructor and TAs for more details on solutions via the Regrade Request tool on Gradescope and during office hours.

**Midterm and final exams**

* There will be **two 2-hour in-person closed-book midterm exams**. One is tentatively scheduled for February 5, 6:30 pm to 8:30 pm, and the other for March 19, 6:30 pm to 8:30 pm, both to be confirmed by the Registrar.
* There will be a **3-hour in-person closed-book final exam, and the Registrar’s Office will schedule its time**.

**Rounding of marks**

* Across the Sciences Undergraduate Education programs, we strive to maintain high standards that reflect the effort that 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.

**General information about missed coursework**

* Students must familiarize themselves with the *University Policy on Academic Consideration – Undergraduate Students in First Entry Programs* posted on the Academic Calendar:
* <https://www.uwo.ca/univsec/pdf/academic_policies/appeals/academic_consideration_Sep24.pdf>,
* This policy does not apply to requests for Academic Consideration submitted for **attempted or completed work**, whether online or in person.
* The policy also does not apply to students experiencing longer-term impacts on their academic responsibilities. These students should consult [Accessible Education](http://academicsupport.uwo.ca/accessible_education/).
* For procedures on how to submit Academic Consideration requests, please see the information posted on the Office of the Registrar’s webpage:

<https://registrar.uwo.ca/academics/academic_considerations/>

All requests for Academic Consideration must be made within 48 hours after the assessment date or submission deadline.

* All Academic Consideration requests must include supporting documentation in this course; that is, **the following assessments** **always require formal supporting documentation**:
	+ **Final exam**
	+ **Midterm exams I and II**
	+ Academic consideration requests with supporting documentation may be granted for **assignments** only for extenuating circumstances that started before the deadline and lasted longer than the No-Late-Penalty Period of 48 hours. In this case, the weight of the missed assignment will be transferred to the other assignments.

**Evaluation Scheme for Missed Exams**

* When a student misses a Midterm Exam and their Academic Consideration has been granted, they will be given a make-up opportunity.
* When a student misses the Final Exam and their Academic Consideration has been granted by providing supporting documentation will be given a make-up opportunity.

**Essential Learning Requirements**

Even when Academic Considerations are granted for missed coursework, the following are deemed essential to earn a passing grade:

* Two of the three assignments must be completed to write the final exam.
* Both midterm exams must be written to write the final exam.

**6. 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](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).

**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.

Participants in this course are not permitted to record lectures and/or office hours, except where recording is an approved accommodation, and the participant has the prior written permission of the instructor.

Electronic devices such as computers, cell phones, headphones, smart watches, iPads, and tablets are not permitted on exams. A scientific non-programmable calculator will be allowed on the midterm and final exams. A graphing/programmable calculator will not be allowed.

**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>.

**Professionalism & Privacy**

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| Lock | Western students are expected to follow the Student Code of Conduct (<https://www.uwo.ca/univsec/pdf/board/code.pdf>). Additionally, the following expectations and professional conduct apply to this course:- All course materials created by the instructor(s) are copyrighted and cannot be sold/shared.- Recordings are not permitted (audio or video) without explicit permission. - Permitted recordings are not to be distributed. |

**Copyright Statement**

Please be aware that all course materials created by the instructor(s) are copyrighted and **cannot be sold/shared**. Those include materials used in assignments, tests/quizzes, midterms, and finals. Any posting/sharing of such materials in part or whole without the owner’s consent is considered a violation of the Copyright Act and will be considered as a scholastic offence.

**7. 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](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/>.