

University of Western Ontario Winter 2026

STATS 9030 - Statistical Inference

Instructor Information

- **Instructor**
Grace Y. Yi, Ph.D.
Professor, Canada Research Chair in Data Science (Tier 1)
Department Statistical and Actuarial Sciences
Department of Computer Science
University of Western Ontario
<https://www.stats.uwo.ca/faculty/ygi>
Email: gyi5@uwo.ca
- **Office Hour:** Thursdays 11:30 - 12:30pm, WSC 235
- **Note:** Due to the high volume of email, the instructor cannot offer effective assistance via email. Students requiring help should attend office hours.

Course Delivery

- **Lectures**
Time: Tuesdays and Thursdays 10:00am - 11:20am
Location: WSC 248
- **Important Dates**
 - Classes begin on Jan. 5 and end on Apr. 9.
 - Reading Week: Feb. 14 - 22

Course Information

- **Prerequisite**
Students are expected to have completed a course in mathematical statistics (e.g., Statistical Sciences 3858B at Western) or an equivalent prerequisite.
- **Topics to be Covered in Lectures**
The course will cover the following topics: maximum likelihood estimation, likelihood ratio tests, estimating functions, model selection, penalized likelihood method, among others.

- **Learning Outcomes**

The course is designed to expose students to advanced topics in statistical inference. By the end of the course, students are expected to gain a solid understanding of likelihood-based statistical inference and to apply key methods for estimation, hypothesis testing, model assessment, and regularization. They are expected to develop skills to formulate appropriate models, evaluate their performance, and interpret results in a variety of applied settings.

Course Materials

- **Lecture Notes**

- There is no single textbook for this course. However, the lecture notes will be organized in a coherent and self-contained manner.
- Attending all lectures is essential for fully understanding the course material.
- Partial course materials will be posted at the course OWL site:

<https://westernu.brightspace.com/>

Students are responsible for checking the site regularly for updates.

- To support effective learning, students are expected to attend lectures and complete their own lecture notes. The instructor will not be distributing lecture notes.

- **Reference Book**

For extended reading, the following books provide useful background and context:

- *Statistical Inference*, 2nd Edition, by George Casella and Roger L. Berger, DUXBURY, 2002.
- *Likelihood and its Extensions*, by Nancy Reid, Cristiano Varin, and Grace Y. Yi, Chapman & Hall/CRC, 2026 (forthcoming).

Evaluation Scheme

15% participation + 50% tests + 35% course work

- **Tests**

- Test 1: 10:00-11:20am Thursday **Feb. 26**
- Test 2: 10:00-11:20pm Thursday **Mar. 26**

- **Participation**

- Participation includes attendance, engagement in class discussions, and overall effort in the course.
- Two sets of practice questions will be distributed before each of the two tests. Students may choose to work on them and submit their solutions; however, the submissions will not be marked or returned.
 - * First Due Date: **Feb. 12**

* Second Due Date: **Mar. 17**

- **Course Work**

This course aims to engage students with active thinking and rigorous theoretical reasoning. Because students come from diverse backgrounds, the course work is designed flexibly to allow students to demonstrate their strengths and potential. In addition to answering the common questions distributed in the final class, students may choose one of the following options or a combination of them:

- (a). Create Your Own Problems and Solutions:
Design a set of at least seven new problems based on course topics and provide fully self-contained, rigorous solutions.
- (b). Counterintuitive Examples / Incorrect Solutions:
Construct at least seven examples that appear correct but are subtly flawed, or that illustrate common pitfalls. Clearly explain why the reasoning fails and what the correct logic should be.
- (c). Application to Your Own Work:
Describe how ideas from the course may assist in your research or Master's project. Explanations should be comprehensive and technically detailed.
- (d). Instructor's Perspective:
Write a summary of the course as if you were teaching it next term. Propose modifications to the lecture notes, explaining what you would retain, remove, or extend, with justification.
- (e). Theoretical Exploration:
Students may select a theorem from the course, restate it clearly, explore its assumptions, and attempt to generalize, relax, or extend the result. All proofs or conjectures should be carefully articulated.
- (f). Mini Literature Review:
Choose a research paper related to the course topics (likelihood, estimating functions, penalized inference, etc.). Provide a summary, restate a central idea in your own words, and explain how it connects to the course.

All submissions need to be rigorous, self-contained, logically laid out, and clearly written.

Course Work Due: **April 10 at 11:59 pm (submitted electronically)**

- **Important Note**

- The tests are *closed book*.
- There will be **NO** make-up tests.
- If a student misses one test for a legitimate reason and provides the required supporting documentation, the weight of that test will be shifted to the final course work.
- If a student misses two tests for legitimate reasons and provides valid supporting documentation, the student will be required to take a closed-book final exam at a time determined by the instructor. This exam will be worth 50% of the final grade.
- If a student misses both tests without an acceptable reason, they will receive a grade of 0 for both tests, resulting in a failure of the course.

Instructor's Expectation

While the instructor cannot prevent students from using ChatGPT and other large language models (LLMs), students are expected to strive to master the course material through independent reasoning, problem-solving, and critical thinking. It is the student's responsibility to ensure that LLMs do not replace their own intellectual effort. Reliance on these tools must not compromise academic integrity or the development of essential analytical and writing skills. Any use of LLMs must be fully disclosed in submitted work. Students remain solely responsible for the accuracy and integrity of their work they submit.

Disclaimer

The lecture notes and any distributed course materials are intended **ONLY** for your own use to enhance your learning in this course. Please do **NOT** share them with anyone **NOT** registering in this course in 2026 without the instructor's permission.

University Policy and Information

- **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 Associate Chair of Graduate Studies of their Faculty of Registration. Please consult University's list of recognized religious holidays.

- 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 Registrarial Services is

<http://www.registrar.uwo.ca>

In accordance with policy,

<http://www.uwo.ca/its/identity/activatenonstudent.html>

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 his/her official university address is attended to in a timely manner.

Scholastic offences are taken seriously and students are directed to read the appropriate policy, specifically, the definition of what constitutes a Scholastic Offence, at this website:

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

A non-programmable calculator is needed in the tests. Other devices such as cell phones cannot be used as a calculator in the tests.

- **Support Services**

Please consult Associate Chair of Graduate Studies of their Faculty of Registration for information on adding/dropping courses, academic considerations for absences, appeals, exam conflicts, and many other academic related matters. 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.

- **Policy on Scholastic Offences:**

https://uwo.ca/univsec/pdf/academic_policies/appeals/scholastic_offences.pdf

- Procedures on Scholastic Offences (Undergraduate):

https://uwo.ca/univsec/pdf/academic_policies/appeals/undergrad_scholastic_offence_procedure.pdf

Procedures on Scholastic Offences (Graduate):

https://uwo.ca/univsec/pdf/academic_policies/appeals/graduate_scholastic_offence_procedure.pdf

- Use of Electronic Devices During Assessments

In courses offered by the Faculty of Science, the possession of unauthorized electronic devices during any in-person assessment (such as tests, midterms, and final examinations) is strictly prohibited. This includes, but is not limited to: mobile phones, smart watches, smart glasses, and wireless earbuds or headphones. Unless explicitly stated otherwise in advance by the instructor, the presence of any such device at your desk, on your person, or within reach during an assessment will be treated as a scholastic offence, even if the device is not in use. Only devices expressly permitted by the instructor (e.g., non-programmable calculators) may be brought into the assessment room. It is your responsibility to review and comply with these expectations.

– Use of Generative AI Tools

Unless otherwise stated, the use of generative AI tools (e.g., ChatGPT, Microsoft Copilot, Google Gemini, or similar platforms) is not permitted in the completion of any course assessments, including but not limited to: assignments, lab reports, presentations, tests, and final examinations. Using such tools for content generation, code writing, problem solving, translation, or summarization—when not explicitly allowed—will be treated as a scholastic offence. If the use of generative AI is permitted for a particular assessment, the conditions of use will be specified by the instructor in advance. If no such permission is granted, students must assume that use is prohibited. It is your responsibility to seek clarification before using any AI tools in academic work.

All required papers may be subject to submission for textual similarity review to the commercial plagiarism detection software under license to the University for the detection of plagiarism. All papers submitted for such checking will be included as source documents in the reference database for the purpose of detecting plagiarism of papers subsequently submitted to the system. Use of the service is subject to the licensing agreement, currently between The University of Western Ontario and Turnitin.com (<http://www.turnitin.com>).

Computer-marked multiple-choice tests and exams may be subject to submission for similarity review by software that will check for unusual coincidences in answer patterns that may indicate cheating.