

STATS 2858A 001: PROBABILITY AND STATISTICS II**Summer 2025****Course Description (Last-updated July 10)****Lecture and Lab:** Online

Tuesday, Wednesday, Thursday, Friday

9:00 am to 11:00 am

Instructor: Parisa Hesari**Office Hours:** By appointment**Email:** Pmokhta@uwo.ca**Course information:****Prerequisite Requirements:** To enroll in this course, you must have earned at least 60% in Statistical Sciences 2857A/B (or the former 2657A/B).**List of Antirequisites:** All other courses in Introductory Statistics (except Statistical Sciences 1023A/B and Data Science 1000A/B or the former Statistical Sciences 1024A/B): Biology 2244A/B, Economics 2122A/B, Economics 2222A/B, Geography 2210A/B, Health Sciences 3801A/B, MOS 2242A/B, Psychology 2811A/B or the former Psychology 2810, Psychology 2801F/G or the former Psychology 2820E, Psychology 2830A/B, Psychology 2850A/B, Psychology 2851A/B, Social Work 2207A/B, Sociology 2205A/B, Statistical Sciences 2035, Statistical Sciences 2141A/B, Statistical Sciences 2143A/B, Statistical Sciences 2244A/B.**Course Learning Outcomes/Objectives**

By the end of this course, students will be able to:

- Explain key concepts of statistical inference, including estimation, sufficiency, and efficiency.
- Apply various methods for point estimation and construct confidence intervals for means, proportions, and variances.

- Evaluate the properties of estimators and confidence intervals using both analytical and simulation-based approaches.
- Perform and interpret hypothesis tests for single populations and comparisons between two populations.
- Use modern statistical techniques such as bootstrap and permutation methods for inference.
- Demonstrate proficiency in identifying appropriate inference procedures based on data type and study design.
- Critically assess statistical results and communicate findings effectively.

Course Timeline and Format

Week	Dates	Tutorial	Contents*	Quiz & Assignment
1	July 08	Chapter 7	Statistical inference: General Concepts	
	July 09	Chapter 7	Parameters and point estimates	
	July 10	Chapter 7	methods of point estimates	Quiz 1
	July 11	Chapter 7	Sufficiency	Assignment 1 Due July 16, 11:59 pm.
2	July 15	Chapter 7	Fisher information and efficiency	
	July 16	Chapter 8	Statistical intervals: Properties of Confidence Intervals (CIs)	
	July 17	Chapter 8	Large sample CI	
	July 18	Chapter 8	CIs of Normal population distribution	Quiz 2
3	July 22	Chapter 8	CIs for the variance	
	July 23	Chapter 8	Bootstrap CI	Assignment 2 Due July 29, 11:59 pm.
	July 24	Chapter 9	Hypothesis and test procedures	
	July 25	Chapter 9	Testing hypothesis, Type I & Type II error, power	
4	July 29	Chapter 9	Tests on population mean	
	July 30	Chapter 9	Tests on population proportion	Quiz 3

	July 31	Chapter 9	p-values	Assignment 3 Due August 8, 11:59 pm.
	August 1	Chapter 10	Z-Tests and CIs for two populations	
5	August 05	Chapter 10	Two-sample t-Tests and CIs	
	August 06	Chapter 10	Analysis of paired data	
	August 07	Chapter 10	Inferences on two population proportions	
	August 08	Chapter 10	Inferences on two population variances	Quiz 4
6	August 12	Chapter 10	Bootstrap and permutation methods	
	August 13	Chapter 12	Linear and logistic regression models	
	August 14	Chapter 12	Estimating model parameters and interpretation of regression coefficients	Assignment 4 Due August 22, 11:59 pm.
	August 15	Chapter 12	Correlation	
7	August 19			Final Exam

*Chapter numbers are referred to Devore & Berk (2012).

Course Textbook and Materials

The required textbook for this course is:

Devore, J.L. & Berk, K.N. (2012). *Modern Mathematical Statistics with Applications* (2nd Edition). Springer.

Supplementary resources:

1. Casella, G., & Berger, R. L. (2002). *Statistical Inference* (2nd ed.).
2. Evans, M. J., & Rosenthal, J. S. (2004). *Probability and statistics: The science of uncertainty*. Macmillan.

These textbooks are not required but are highly recommended for students seeking a deeper understanding of concepts covered in the course.

Methods of Evaluation

Since this is an online course with synchronous components, students must be available during the scheduled lecture times for live sessions, assessments, or in-class activities.

Assignments (4) 32%

Quizzes (4) 10%

Class Activity (Participation/Engagement) * 8%

Final Exam 50%

* Activities may include quick polls, short-answer practice, reflection prompts, group discussions, and interactive problem-solving.

Software Requirements

To fully participate in this course, students are required to install the following software before the second class. Note: R must be installed before RStudio, as RStudio runs on top of R.

Download R from: <https://cran.r-project.org>

Download RStudio from: <https://posit.co/download/rstudio-desktop>

Note: Throughout the course, some examples and demonstrations will be provided using the statistical software R to help illustrate key concepts. However, prior knowledge of R is not required, and students are not expected to use R in assignments, quizzes, or exams. These examples are intended to support understanding and are entirely optional for student engagement.

Important Notes:

1. A minimum overall grade of 60% is required to pass the course.
2. Assignments submitted late without valid documentation will receive a grade of zero.
3. For the final exam, calculators and up to two double-sided pages of notes are permitted. Computers and internet access are not allowed.

Western Academic Policies and Guidelines

Missed Course Responsibilities

All planned absences for non-medical reasons must receive prior approval. If an unexpected absence occurs due to compassionate reasons, supporting documentation may be required. Any documentation for academic accommodation, whether for medical or non-medical reasons, must be submitted directly to the instructor by the student. For more details, refer to the University's medical illness policy:

https://www.uwo.ca/univsec/pdf/academic_policies/appeals/accommodation_medical.pdf.

The **Student Medical Certificate** form can be found here:

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 as soon as possible. They will assess your eligibility to take a Special Examination (the University's term for a makeup exam).

Accommodation and Accessibility

Religious Accommodation

If a course requirement overlaps with a religious holiday that necessitates missing class or avoiding certain activities, students should submit a written request for accommodation to the course instructor or the Academic Counselling office of their Faculty at least two weeks before the holiday. A list of officially recognized religious holidays is available at:

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

Accommodation for Disabilities

Students with disabilities are encouraged to reach out to Accessible Education for support.

Accommodations are determined based on appropriate documentation, such as medical or psychological assessments. Details on the university's policy regarding academic accommodations for students with disabilities can be found here:

https://www.uwo.ca/univsec/pdf/academic_policies/appeals/AcademicAccommodation_disabilities.pdf

Academic Policies

For academic regulations and services, visit the Registration Services website:

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

As outlined in university policy ([MAPP 1.13](#)), each student is assigned an official Western email account. It is the student's responsibility to regularly check and respond to messages sent to this address.

Recording of lectures or labs is not permitted unless it is part of an approved academic accommodation and written permission from the instructor has been obtained in advance.

Please note that the use of online platforms such as Chegg is closely monitored. Posting assignment-related questions to such websites will be investigated and treated as a scholastic offence, which may lead to academic penalties.

Academic integrity is taken very seriously. Students should review the university's definition and policies regarding Scholastic Offences here:

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

Support Resources

Please refer to the Science & Basic Medical Sciences Academic Counselling page:

<https://www.uwo.ca/sci/counselling/>, for help with academic concerns such as course changes, exam conflicts, absences, appeals, and more,.

If you're experiencing emotional or mental health challenges, please visit Mental Health@Western for a comprehensive list of available support services: <https://uwo.ca/health/>.

Western University is committed to supporting survivors of gender-based and sexual violence with compassion and care. If you've experienced such trauma, emergency contacts, and additional support

information are available here: https://www.uwo.ca/health/student_support/survivor_support/get-help.html.

To strengthen your academic skills, Learning Skills Services at the Student Development Centre offers workshops on time management, reading strategies, and exam preparation. You can also receive individual help year-round or drop in during the Fall/Winter term: <https://learning.uwo.ca>.

Western is dedicated to fostering a vibrant campus community through both in-person and online learning. Visit the Digital Student Experience website for tools and resources to support your academic success and well-being: <https://www.uwo.ca/se/digital/>. Additional peer-led services are available through the USC: <https://westernusc.ca/services/>