

Statistical Sciences 2143B Course Outline

1. Course Information

Course Information

Statistical Sciences 2143: Applied Statistics and Data Analysis for Engineers
2024-2025 Winter Term

Lectures: Monday, Wednesday, Friday 1:30-2:30 pm
Location: SSC-2050

Tutorial: Thursday 11:30 am - 12:30 pm
Location: AHB-1R40

Constraints

RESTRICTED TO CHEMICAL, GREEN PROCESS, MECHANICAL, MECHATRONICS, INTEGRATED, COMPUTER AND CIVIL ENGINEERING STUDENTS, SCIENCE STUDENTS AND SCHOLARS ELECTIVES.

This course cannot be taken for credit in any module in Data Science, Statistics, Actuarial Science, or Financial Modelling, other than the Minor in Applied Statistics or the Minor in Applied Financial Modeling.

Requisites

0.5 course from Numerical and Mathematical Methods 1412A/B, Calculus 1000A/B, Calculus 1500A/B, the former Applied Mathematics 1412A/B, plus 0.5 course from Numerical and Mathematical Methods 1414A/B, Calculus 1301A/B, Calculus 1501A/B, the former Applied Mathematics 1414A/B. The former Applied Mathematics 1413 may also be used to meet this 1.0 course prerequisite.

Antirequisites

All other courses in Introductory Statistics (except Statistical Sciences 1023A/B, Data Science 1000A/B or 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 2244A/B, Statistical Sciences 2858A/B.

Unless you have either the requisites for this course or written special permission from your Dean 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

Instructor: Dr Ricardas Zitikis

E-mail: rzitikis@uwo.ca

Office: WSC 231

Office Hour: After each lecture

When contacting:

- use only Western (@uwo.ca) email address
- include the course code **Stats 2143** into the subject line of your email so that I would know which class you belong to (I am teaching other classes too)

3. Course Syllabus, Schedule, Delivery Mode

A data-driven introduction to statistics intended primarily for students in Chemical and Mechanical Engineering. Exploratory data analysis, probability, the Binomial, Poisson, Normal, Chi-Square and F distributions. Estimation, correlation, and regression (model building and parameter estimation), analysis of variance, design of experiments.

Learning Outcomes

Upon successful completion of this course, students will be familiar with:

- Techniques used in exploring, organizing, and describing data
- Producing data through surveys
- Design of experiments
- Basic concepts and uses of statistics
- Basic concepts of probability and distributions
- Statistical inference: confidence intervals, tests of hypotheses
- Bivariate and multivariate data
- Pitfalls and controversies

Classes begin: January 6, 2025

Classes end: April 4, 2025

Weeks	Topics and assessments
Week 1 (Jan 6 -)	Course introduction Chapter 1 (The Role of Statistics in Engineering) Chapter 2 (Probability; start) No tutorial
Week 2 (Jan 13 -)	Chapter 2 (Probability)
Week 3 (Jan 20 -)	Chapter 3 (Discrete Random Variables and Probability Distributions)
Week 4 (Jan 27 -)	Chapter 4 (Continuous Random Variables and Probability Distributions)
Week 5 (Feb 3 -)	Chapter 5 (Joint Probability Distributions) Test 1 (February 6; based on Chapters 2-4)
Week 6 (Feb 10 -)	Chapter 6 (Descriptive Statistics)
Week 7	Spring Reading Week: February 15-23
Week 8 (Feb 24 -)	Chapter 7 (Point Estimation of Parameters and Sampling Distributions)
Week 9 (March 3 -)	Chapter 8 (Statistical Intervals for a Single Sample)
Week 10 (March 10 -)	Chapter 9 (Tests of Hypotheses for a Single Sample) Test 2 (March 13; based on Chapters 2-8)
Week 11 (March 17 -)	Chapter 10 (Statistical Inference for Two Samples)
Week 12 (March 24 -)	Chapter 11 (Simple Linear Regression and Correlation)
Week 13 (March 31 -)	Chapter 13 (Design and Analysis of Single-Factor Experiments).
Regular Final Exam (during the April Exam Period (April 7–30); based on Chapters 2-11 and 13)	
Make-up Final Exam (in May; exact date will be announced around mid-April)	

4. Course Materials

Required Textbook

Applied Statistics and Probability for Engineers (7th edition) by Montgomery and Runger. (Students need to purchase this edition. Earlier editions will not be sufficient.)

Western Bookstore: [https://bookstore.uwo.ca/textbook-search?campus=UWO&term=W2024B&courses%5B0%5D=001 UW/STA2143B](https://bookstore.uwo.ca/textbook-search?campus=UWO&term=W2024B&courses%5B0%5D=001%20UW/STA2143B)

Wiley direct: <https://www.wiley.com/en-us/Applied+Statistics+and+Probability+for+Engineers%2C+7th+Edition-p-9781119400363>

Recommended Supplementary Material

WileyPLUS

Contains practice problems and tests with solutions and various types of feedback, including video feedback.

<https://www.wiley.com/en-us/Applied+Statistics+and+Probability+for+Engineers%2C+7th+Edition-p-978EEGRP37984>

A student registration flyer with a purchasing code is posted on OWL Brightspace.

General Information

All course materials will be posted to OWL: <https://westernu.brightspace.com/>

Students are responsible for checking the course OWL site 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.

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

Two cumulative tests with multiple-choice and essay components. Each of the two tests will be during tutorial hour in the tutorial room (AHB-1R40).

TEST 1: 11:30 am – 12:20 pm, Thursday, February 6, 2025

TEST 2: 11:30 am – 12:20 pm, Thursday, March 13, 2025

The final exam is a three-hour cumulative examination with multiple-choice and essay components. The final exam will be scheduled by the Registrar Office during the April examination period.

The overall course grade will be calculated as listed below:

Test 1	20%
Test 2	30%
Final exam	50%

Test 1, Test 2, and Final Exam will be closed book. Non-programmable hand-held calculators will be allowed.

Accommodated Evaluations

- There will be **no make-up tests**. If you miss a test due to a legitimate reason (one miss can be self-reported, but if more, then the other miss requires a counsellor's permission), then the weight of that test will be moved to the final exam. Namely, the following rules will apply:
 - If you miss Test 1 and write Test 2, then the Final Exam will be worth 70% of your final grade.
 - If you write Test 1 but miss Test 2, then the Final Exam will be worth 80% of your final grade.
 - If you miss both Test 1 and Test 2, then the Final Exam will be worth 100% of your final grade.
- Note.** A self-reported absence can be used only once. In other words, two tests cannot be missed using self-reported absences.
- If you miss the Final Exam due to a legitimate reason (to be determined by a counsellor), you will have a chance to write a **Make-up Final Exam**, which will be in May 2025 (exact date and time will be determined in mid-April). See **Absences from Final Examinations** below.

Rounding of marks statement

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

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; however, recognizing that formal documentation may not be available in some extenuating circumstances, the policy allows students to make one Academic Consideration request **without supporting documentation** in this course. However, the following assessments are excluded from this, and therefore always require formal supporting documentation:

- Examinations scheduled during official examination periods.
- One of the two midterm tests

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.>

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.

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.

In the tests and exam, non-programmable hand-held calculators will 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.

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>) 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/>.