

Statistical Sciences 2143B Course Outline

1. Course Information

Course Information

Statistical Sciences 2143
2022-2023 Winter Term

Lectures: Monday, Wednesday, Friday 1:30-2:30 pm
Location: WSC 55

Tutorial: Thursday 11:30 am - 12:30 pm
Location: NSC 145

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 2810, 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, Statistical Sciences 2037A/B if taken prior to Fall 2010.

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 the instructor:

- use only Western (@uwo.ca) email address
- the subject line must contain the course code SS2143

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
 - Data, histograms, and fitting densities
 - Non-parametric vs parametric densities
 - Statistics (sample means, proportions)
- Basic concepts of probability and distributions
 - Normal distribution
 - Chi-square
 - t-distribution
 - F-distribution
 - Binomial
 - Poisson
 - Exponential distribution and probability calculation
 - Weibull distribution and probability calculation
- Statistical inference, including confidence intervals and tests of hypotheses
 - Means
 - Proportions
 - Difference between two means (matched pairs, independent populations)
 - Difference between two proportions
- Bivariate and multivariate data
 - Regression
 - Correlation

- Model building
- Parameter estimation
- Two-way contingency tables
- Simpson's paradox (in contingency tables, regression, and in other forms)
- Analysis of variance (ANOVA)
- Pitfalls and controversies

Classes begin: January 9, 2023

Family Day and Spring Reading Week: February 18-26, 2023

Classes end: April 10, 2023

4. Course Materials

Required Textbook

Introduction to the Practice of Statistics (Tenth Edition) by David S. Moore, George P. McCabe, and Bruce Craig <https://www.macmillanlearning.com/college/ca/product/Introduction-to-the-Practice-of-Statistics/p/1319244440>

Coverage: Chapters 1-13.

Recommended Online Learning Platform

Achieve for *Introduction to the Practice of Statistics* integrates outcome-based learning objectives and a wealth of examples with assessment in an easy-to-use interface. Students are provided with rich digital resources that solidify conceptual understanding, as well as homework problems with hints, answer-specific feedback, and a fully worked solutions. <https://achieve.macmillanlearning.com/start>

Students are responsible for checking the course OWL site (<http://owl.uwo.ca>) 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.

All course material will be posted to OWL: <http://owl.uwo.ca>.

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.

Technical Requirements

Stable internet connection, Google Chrome or Mozilla Firefox browsers to optimally use OWL; update your browsers frequently. You will need:

- a laptop or a computer
- a working microphone and a webcam
- a reliable internet connection

5. Methods of Evaluation

There will be two cumulative multiple-choice tests. Each test is scheduled during the tutorial hour as follows:

TEST 1: 11:30 am – 12:30 pm, Thursday, February 16, 2023

TEST 2: 11:30 am – 12:30 pm, Thursday, March 16, 2023

The final exam, which is worth 60%, will be a three-hour cumulative multiple-choice examination. It will be scheduled by the Registrar Office during the April examination period (April 13-30, 2023).

The overall course grade will be calculated as listed below:

Test 1	20%
Test 2	20%
Final Exam	60%

All the assessments (Tests 1 and 2, as well as the Final Exam) will be closed book. Non-programmable hand-held calculators will be allowed.

Accommodated Evaluations

- There will be no make-ups for Tests 1 and 2. If you miss a test due to a legitimate reason (to be determined by counsellors), the percentage of the assessment (a test or the Final Exam) that you will write next will become the percentage of the missed test. For example, if you miss Test 1 but write Test 2, the percentage of Test 2 will also be the percentage of Test 1. If you miss Tests 1 and 2, the percentage of the Final Exam will become the percentages of Tests 1 and 2.
- If you miss the Final Exam due to a legitimate reason (to be determined by counsellors), you will have a chance to write a make-up final exam in May, 2023. See **Absences from Final Examinations** below.

Rounding of Marks Statement

Across the Sciences Undergraduate 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.

6. Student Absences

Academic Consideration for Student Absences

Students who experience an extenuating circumstance (illness, injury or other extenuating circumstance) sufficiently significant to temporarily render them unable to meet academic requirements must provide valid medical or supporting documentation to the Academic Counselling 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/accommodation_medical.pdf

The Student Medical Certificate is available at

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

Students should also note that individual instructors are not permitted to receive documentation directly from a student, whether in support of an application for consideration on medical grounds, or for other reasons.

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 the Academic Counselling office of their Faculty of Registration. Please consult University's list of recognized religious holidays (updated annually) at

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

Absences from Final Examinations

If you miss the Final Exam, please contact the Academic Counselling office of your Faculty of Registration as soon as you are able to do so. They will assess your eligibility to write the Special Examination (the name given by the University to a makeup Final Exam).

You may also be eligible to write the Special Exam if you are in a "Multiple Exam Situation" (e.g., more than 2 exams in 23-hour period, more than 3 exams in a 47-hour period).

If a student fails to write a scheduled Special Examination, the date of the next Special Examination (if granted) normally will be the scheduled date for the final exam the next time this course is offered. The maximum course load for that term will be reduced by the credit of the course(s) for which the final examination has been deferred. See the Academic Calendar for details (under [Special Examinations](#)).

7. Accommodation and Accessibility

Accommodation Policies

Students with disabilities work with Accessible Education (formerly SSD), 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,

8. Academic Policies

The website for Registrarial Services is <http://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 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 the following Web site:

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

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.

In the event of health lock-down, remote proctoring software may be used in this course. By taking this course, you are consenting to the use of this software and acknowledge that you will be required to provide **personal information** (including some biometric data) and the session will be **recorded**. Completion of this course will require you to have a reliable internet connection and a device that meets the technical requirements for this service. More information about this remote proctoring service, including technical requirements, is available on Western's Remote Proctoring website at:

<https://remoteproctoring.uwo.ca>.

9. Support Services

Please visit the Science & Basic Medical Sciences Academic Counselling 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/>.

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 (519) 661-2147 if you have any questions regarding accommodations.

Learning-skills counsellors at the Student Development Centre (<http://www.sdc.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.

Students who are in emotional/mental distress should refer to Mental Health@Western (<http://www.health.uwo.ca/mentalhealth>) for a complete list of options about how to obtain help.

Additional student-run support services are offered by the USC, <http://westernusc.ca/services>.