

Statistical Sciences 2143B Course Outline

1. Course Information

Course Information

Statistical Sciences 2143
2021-2022 Winter Term

Lectures: Monday, Wednesday, Friday 1:30-2:30 pm
Location: ONLINE/MC-110

Tutorial: Thursday 11:30 am - 12:30 pm
Location: ONLINE/WSC-55

From January 10 to January 31, all lectures are scheduled online with synchronous Zoom lecturing. Any change will be noted in advance.

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 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 10, 2022

Family Day and Spring Reading Week: February 19-27, 2022

Classes end: April 8, 2022

Course delivery and assessment with respect to the COVID-19 pandemic

Although the intent is for this course to be delivered in-person to the extent possible, the changing COVID-19 landscape may necessitate some or all of the course to be delivered online, either synchronously (i.e., at the times indicated in the timetable) or asynchronously (e.g., posted on OWL for students to view at their convenience), as deemed most appropriate by the instructor. The grading scheme will not change. Any assessments affected will be conducted online as determined by the course instructor.

When deemed necessary, tests and examinations in this course will be conducted using a remote proctoring service. By taking this course, you are consenting to the use of this software and acknowledging that you will be required to provide personal information (including some biometric data) and that 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>

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>

We aim at covering the entire textbook, but we shall surely cover 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>

Useful Supplementary Material

- *Recommended tutorial material* designed by the instructor and uploaded into the Tutorial folder with the aim of illuminating difficult but highly relevant for this course topics
- *An Introduction to the Basics of Reliability and Risk Analysis* by Enrico Zio. Series on Quality, Reliability and Engineering Statistics, World Scientific, Singapore
- *Basics of Reliability and Risk Analysis: Worked Out Problems and Solutions* by Enrico Zio, Piero Baraldi, and Francesco Cadini. Series on Quality, Reliability and Engineering Statistics, World Scientific, Singapore

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 three cumulative multiple-choice tests. Each test is scheduled during the lecture hour on Monday.

The final exam, which is worth 50%, will be a three-hour cumulative multiple-choice examination. It will be scheduled by the Registrar Office during the examination period (April 10-30, 2022).

The overall course grade will be calculated as listed below:

Test 1	10%
Test 2	15%
Test 3	25%
Final Exam	50%

All the assessments (tests 1-3 and the final exam) are closed book. Non-programmable hand-held calculators are allowed.

The following table will be continually updated and posted on OWL. We aim at covering the entire textbook, but we shall surely cover Chapters 1-13.

Date	Textbook	Notes
Jan 10		Course outline. OWL. Textbook. Achieve. Q & A.
Jan 12		
Jan 13		
Jan 14		
Jan 17		
Jan 19		
Jan 20		
Jan 21		
Jan 24	TEST 1	Location: ONLINE. Multiple choice. Closed book. Cumulative.
Jan 26		
Jan 27		
Jan 28		
Jan 31		
Feb 2		
Feb 3		
Feb 4		
Feb 7		
Feb 9		
Feb 10		
Feb 11		
Feb 14	TEST 2	Location: MC-110. Multiple choice. Closed book. Cumulative.
Feb 16		
Feb 17		
Feb 18		
Feb 19-27		Family Day and Spring Reading Week.
Feb 28		
Mar 2		
Mar 3		
Mar 4		
Mar 7		
Mar 9		
Mar 10		
Mar 11		
Mar 14	TEST 3	Location: MC-110. Multiple choice. Closed book. Cumulative.
Mar 16		
Mar 17		
Mar 18		
Mar 21		
Mar 23		
Mar 24		
Mar 25		
Mar 28		
Mar 30		

Mar 31		
Apr 1		
Apr 4		
Apr 6		
Apr 7		
Apr 8		
TBA	FINAL EXAM	Three hours. Multiple choice. Closed book. Cumulative.

Accommodated Evaluations

- There will be no make-ups for Tests 1-3. If you miss a test, its percentage will be appended to the next assessment (a test or the final exam, whichever comes next).
- 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 some time in 2022. 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 may submit a request for academic consideration through the following routes:

- Submitting a Self-Reported Absence (SRA) form provided that the conditions for submission are met. To be eligible for a Self-Reported Absence:
 - an absence must be no more than 48 hours
 - the assessments must be worth no more than 30% of the student’s final grade
 - no more than two SRAs may be submitted during the Fall/Winter term
- For medical absences, submitting a Student Medical Certificate (SMC) signed by a licensed medical or mental health practitioner to the Academic Counselling office of their Faculty of Registration.
- Submitting appropriate documentation for non-medical absences to the Academic Counselling office in their Faculty of Registration.

Note that in all cases, students are required to contact their instructors within 24 hours of the end of the period covered, unless otherwise instructed in the course outline.

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. **All documentation required for absences that are not covered by the Self-Reported Absence Policy must be submitted to the Academic Counselling office of a student's Home Faculty.**

For the policy on Academic Consideration for Student Absences – Undergraduate Students in First Entry Programs, see:

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

and for the Student Medical Certificate (SMC), see:

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

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>.