

Department of Statistical and Actuarial Sciences
STATISTICAL SCIENCE 1024A – Section 001
Introduction to Statistics

Course outline for Fall 2020



Although this academic year might be different, Western University is committed to a **thriving campus**. We encourage you to check out the [Digital Student Experience](#) website to manage your academics and well-being. Additionally, the following link provides available resources to support students on and off campus: <https://www.uwo.ca/health/>.

Technical Requirements and Important Dates:



Stable internet connection



Laptop or computer



Working microphone



Working webcam



Classes Start	Reading Week	Classes End	Study day(s)	Exam Period
September 9	November 2 - 8	December 9	December 10	December 11 - 22

* November 12, 2020: Last day to drop a first-term half course or a first-term full course without penalty

1. Course Information

Course information

Introduction to Statistics

Statistical Science 1024A – Section 001 – Fall 2020

This *asynchronous* Section 001 is designed to accommodate students in different time zones.

The main vehicles for delivering the course will be OWL and e-mail (rzitikis@uwo.ca). If/when a need arises, other modes of communication will be set up.

List of Prerequisite(s)

Grade 12U Mathematics or Mathematics 0110A/B or Mathematics 1229A/B

List of Antirequisite(s)

All other courses or half courses in Introductory Statistics, except Statistical Sciences 1023A/B and Statistical Sciences 2037A/B. For a full list of Introductory Statistics courses, see <https://www.westerncalendar.uwo.ca/Departments.cfm?DepartmentID=55>. You cannot take a listed anti-requisite course concurrently with Statistical Sciences 1024A/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



Course Coordinator	Contact Information
Dr. Ricardas Zitikis	rzitikis@uwo.ca , zitikis@stats.uwo.ca

Instructor(s) or Teaching Assistant(s)	Contact Information
Dr. Ricardas Zitikis	rzitikis@uwo.ca , zitikis@stats.uwo.ca

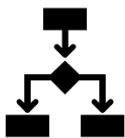
Office Hours	Modes of Communication	Names
Flexible	OWL, e-mail, or other	Dr. Ricardas Zitikis
Flexible	OWL, e-mail, or other	Team of TAs

Students must use their Western (@uwo.ca) email addresses when contacting their instructors and indicate the course number (SS1024) in the subject line.

3. Course Syllabus, Schedule, and Delivery Mode

Course Description

Statistical inference, experimental design, sampling design, confidence intervals and hypothesis tests for means and proportions, regression and correlation.



Type	Mode	Dates	Time	Frequency
Lecture	Asynchronous online	N/A	Flexible	weekly

Learning Outcomes



Upon successful completion of this course, students will have a basic understanding of:

- The techniques used in exploring, organizing and describing data.
- Producing data through surveys and experiments.
- Random behaviour.
- Statistical inference: including confidence interval construction and tests of hypotheses.

Table of Contents and Schedule

Week	Overview	Topics
1	Dates: Sept 9 – 13 Course Introduction	
2	Ch 1: Picturing Distributions with Graphs Ch 2: Describing Distributions with Numbers	Sections 1.1-1.4, 1.6 (exclude stemplots): Individuals, variable, pie charts, bar graphs, histograms, interpretation, time plots Sections 2.1-2.8: Measuring center, mean, median, quartiles, 5-number summary, boxplots, outliers, standard deviation
3	Dates: Sept 21 – 27 Ch 3: The Normal Distributions	Sections 3.1-3.8: Density curves, normal distributions, 68-95-99.7 rule, standard normal distribution, normal proportions, normal table
4	Dates: Sept 28 – Oct 4 Ch 4: Scatterplots and Correlation Ch 5: Regression	Sections 4.1-4.6: Explanatory & response variables, scatterplots, correlation Sections 5.1-5.2, 5.4-5.8: Regression lines, least-squares regression line, residuals, influential observations, cautions
Quiz 1: Tentative, as scheduled by the Registrar		
5	Dates: Oct 5 – 11 Ch 6: Two-Way Tables	Sections 6.1-6.3: Marginal & conditional distributions, Simpson's paradox
6	Dates: Oct 12 – 18 Ch 8: Producing Data: Sampling Test 1 review	Sections 8.1-8.7 (exclude Table B): Population, sample, simple random sample (SRS), inference, other sampling designs
Test 1: Tentative, as scheduled by the Registrar		
7	Dates: Oct 19 – 25 Ch 9: Producing Data: Experiments Ch 10: Data Ethics	Sections 9.1-9.7: Observation versus experiment, subjects, factors, treatments, experimental designs Sections 10.1-10.5: Institutional review boards, informed consent, confidentiality, clinical trials



8	<p>Dates: Oct 26 – Nov 1</p> <p>Ch 12: Introducing Probability</p> <p>Ch 13: General Rules of Probability</p> <p>Ch 14: Sampling Distributions</p>	<p>Sections 12.1-12.8: Randomness, probability models, probability rules, finite, continuous, random variables, personal probability</p> <p>Sections 13.1-13.5: Addition rule, independence, multiplicative rule, conditional probability</p> <p>Sections 14.1-14.6: Parameters, statistics, law of large numbers, sampling distributions, central limit theorem, statistical significance</p>
Quiz 2: Tentative, as scheduled by the Registrar		
9	<p>Dates: Nov 2 – 8</p> <p>Reading Week</p>	N/A
10	<p>Dates: Nov 9 – 15</p> <p>Ch 15: Confidence Intervals</p> <p>Test 2 review</p>	<p>Sections 15.1-15.4: Statistical estimation, margin of error, confidence intervals for a population mean</p>
Test 2: Tentative, as scheduled by the Registrar		
11	<p>Dates: Nov 16 – 22</p> <p>Ch 16: Tests of Significance</p> <p>Ch 17: Inference in Practice</p>	<p>Sections 16.1-16.5: Hypotheses, P-values, tests for a population mean</p> <p>Sections 17.1-17.5: Conditions, cautions, sample size for confidence intervals, power of a statistical test (definition only)</p>
12	<p>Dates: Nov 23 – 29</p> <p>Ch 19: Inference about a Population Mean</p>	<p>Sections 19.1-19.4, 19.6: t-distribution, one-sample t confidence interval, one-sample t test, matched pairs</p>
Quiz 3: Tentative, as scheduled by the Registrar		
13	<p>Dates: Nov 30 – Dec 6</p> <p>Ch 20: Comparing Two Means</p>	<p>Sections 20.1-20.3, 20.5-20.8: Two-sample problems, two-sample confidence intervals and hypothesis tests, robustness</p>
14	<p>Dates: Dec 7 – 9</p> <p>Ch 21: Inference about a Population Proportion</p>	<p>Sections 21.1-21.5: (Time Permitting) Sample proportion, large sample confidence intervals, sample size, significance tests</p>

Online Participation and Engagement



- Students are expected to participate and engage with content as much as possible.
- Students can post on OWL Forum their questions, answers, and have discussions with their peers, TA's, and the instructor.

4. Course Materials

A customized loose-leaf textbook is required: *The Basic Practice of Statistics* by Moore, Notz and Fligner. The customized textbook includes a subscription to Sapling. Sapling Learning is an online learning system that can be used as an extra resource as you take this course. This supplement includes resources (i.e., supplementary videos, online applets, tutorials and extra practice problems) that will be particularly useful for any concepts you find challenging.

Note that this customized version is based on the 8th Edition of the textbook of the same name. Therefore, if you are unable to obtain a copy of the customized book, the standard 8th Edition will suffice (but may be more expensive). However, note that our listed chapter indices are with respect to the customized textbook. Chapters 14-21 in the customized textbook correspond to Chapters 15-22 in the standard 8th Edition.



Students should check OWL (<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. Students are responsible for checking OWL on a regular basis.

All course material will be posted to OWL: <http://owl.uwo.ca>. Any changes will be indicated on the OWL site and discussed with the class.

If students need assistance, 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.

[Google Chrome](#) or [Mozilla Firefox](#) are the preferred browsers to optimally use OWL; update your browsers frequently. Students interested in evaluating their internet speed, please click [here](#).

5. Methods of Evaluation

A) Recommended Textbook Exercises

A schedule of topics and recommended textbook exercises are provided in this course outline (see below). Although these exercises are not graded, they will be good practice and useful to your learning, preparing for quizzes and tests. Students will find the solutions to the textbook exercises on OWL.

B) Midterm Tests

There will be 2 multiple-choice tests administered through OWL Tests & Quizzes.

Students will have 2 continuous hours to complete each test.

The exact dates for Tests 1 and 2 will be scheduled by the Registrar and announced on OWL as soon as possible.

Chapters and topics for the tests will be announced in advance through OWL. Students will be required to show their work by uploading their hand-written calculations/work in a single pdf file into their Dropbox folder on OWL within 30 minutes of completing each test.

C) Quizzes

The goal of our quizzes is to make sure that students keep up with the course material between our major examinations. There will be three quizzes, each comprised of two parts.

The first part of each quiz is a short multiple-choice test administered through OWL Tests & Quizzes, as per our midterms. Students will have 45 continuous minutes to complete each quiz.

Students will be required to show their work by uploading their hand-written calculations/work in a single pdf file into their Dropbox folder on OWL within 30 minutes of completing the first part.

The exact dates for Quizzes 1, 2, and 3 will be scheduled by the Registrar and announced on OWL as soon as possible.

The second part of each quiz is a written assessment that will be due within *one week from when the online part of its quiz becomes available*. Responses must be typed and submitted in a single pdf file into their Dropbox folder on OWL before the deadline.

Both parts of a quiz contribute equally towards a student's total effective grade on that quiz. A student's "Quizzes" component in the marking scheme is based on their top two quiz grades (i.e., we drop the single lowest quiz grade).

D) Final Exam

The final exam will be a three-hour cumulative multiple-choice examination. It will be scheduled by the Registrar's office (Examination period Dec 11 to 22, 2020). Students will be required to show their work by uploading their hand-written calculations/work in a single pdf file into their Dropbox folder on OWL within 30 minutes of completing each test.

Note: Quiz and test topics will be finalized and announced closer to their dates.

The overall course grade will be calculated as listed below:

Quizzes (best 2 of 3)	30%
Test 1	20%
Test 2	20%
Final Exam	30%

Accommodated Evaluations

- There is NO makeup test to either Test 1 or Test 2. If you miss either test (with a valid reason), the weight of the test(s) will be moved to the final exam.
- Due to the flexibility of the marking scheme, there are no accommodations for missing the online multiple-choice portion of quizzes or for missing the submission deadline of written components. Accommodation is already taken into consideration within the marking scheme.
- In order to pass the course, a student must complete the final exam.

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. 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 accommodation policy can be found here:

[Academic Accommodation for Students with Disabilities.](#)

Academic Consideration for Student Absence

Students will have up to two (2) opportunities during the regular academic year to use an on-line portal to self-report an absence during the term, provided the following conditions are met: the absence is no more than 48 hours in duration, and the assessment for which consideration is being sought is worth 30% or less of the student’s final grade. Students are expected to contact their instructors within 24 hours of the end of the period of the self-reported absence, unless noted on the syllabus.

Students are not able to use the self-reporting option in the following circumstances:

- for exams scheduled by the Office of the Registrar (e.g., December and April exams)
- absence of a duration greater than 48 hours,
- assessments worth more than 30% of the student’s final grade,
- if a student has already used the self-reporting portal twice during the academic year

If the conditions for a Self-Reported Absence are *not* met, students will need to provide a Student Medical Certificate if the absence is medical, or provide appropriate documentation if there are compassionate grounds for the absence in question.

Students are encouraged to contact their Faculty academic counselling office to obtain more information about the relevant documentation.

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 Western University policy on Consideration for Student Absence, see [Policy on Academic Consideration for Student Absences - Undergraduate Students in First Entry Programs](#)

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

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

Religious Accommodation

Students should consult the University's list of recognized religious holidays, and should give reasonable notice in writing, prior to the holiday, to the Instructor and an Academic Counsellor if their course requirements will be affected by a religious observance.

Additional information is given in the [Western Multicultural Calendar](#).

You may also be eligible to write the Special Exam if you are in a "Multiple Exam Situation" (see http://www.registrar.uwo.ca/examinations/exam_schedule.html).

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 Academic Calendar for details (under [Special Examinations](#)).

7. 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.

Use of Electronic Devices

Students are allowed to use a non-programmable calculator on quizzes, midterms, and the final exam.

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.

Tests and examinations in this course will be conducted using the remote proctoring service, Proctortrack. 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**. More information about this remote proctoring service is available in the Online Proctoring Guidelines at the following link:

<https://www.uwo.ca/univsec/pdf/onlineproctorguidelines.pdf>.

Completion of this course will require you to have a reliable internet connection and a device that meets the technical requirements for this service. Information about the technical requirements are available at the following link:

<https://www.proctortrack.com/tech-requirements/>.

Professionalism & Privacy

Western students are expected to follow the [Student Code of Conduct](#). Additionally, the following expectations and professional conduct apply to this course:



- Students are expected to follow online etiquette expectations provided below.
- All course materials created by the instructor(s) are copyrighted and cannot be sold/shared.
- Recordings are not permitted (audio or video) without explicit permission.
- Permitted recordings are not to be distributed.
- Students will be expected to take an academic integrity pledge before some assessments.

Online Etiquette

Some components of this course will involve online interactions. To ensure the best experience for both you and your classmates, please honour the following rules of etiquette:

- Please “arrive” to class on time.
- Please use your computer and/or laptop if possible (as opposed to a cell phone or tablet).
- Ensure that you are in a private location to protect the confidentiality of discussions in the event that a class discussion deals with sensitive or personal material.
- To minimize background noise, kindly mute your microphone for the entire class until you are invited to speak, unless directed otherwise.
- In order to give us optimum bandwidth and web quality, please turn off your video camera for the entire class unless you are invited to speak.
- Unless invited by your instructor, do **not** share your screen in the meeting.

The course instructor will act as moderator for the class and will deal with any questions from participants. To participate please consider the following:

- If you wish to speak, use the “raise hand” function and wait for the instructor to acknowledge you before beginning your comment or question.
- Remember to unmute your microphone and turn on your video camera before speaking.
- Self-identify when speaking.

- Remember to mute your mic and turn off your video camera after speaking (unless directed otherwise).

General considerations of “netiquette”:

- Keep in mind the different cultural and linguistic backgrounds of the students in the course.
- Be courteous toward the instructor, your colleagues, and authors whose work you are discussing.
- Be respectful of the diversity of viewpoints that you will encounter in the class and in your readings. The exchange of diverse ideas and opinions is part of the scholarly environment. “Flaming” is never appropriate.
- Be professional and scholarly in all online postings. Cite the ideas of others appropriately.

Note that disruptive behaviour of any type during online classes, including inappropriate use of the chat function, is unacceptable. Students found guilty of Zoom-bombing a class or of other serious online offenses may be subject to disciplinary measures under the Code of Student Conduct.

Copyright Statement

Please be aware that all course materials created by the instructor(s) are copyrighted and cannot be **sold/shared**. Those include materials used in tests/quizzes, midterms, and finals. Any posting/sharing of such materials in part or whole without owner’s consent is considered as violation of the Copyright Act and will be considered as a scholastic offence.

In addition, online services such as Chegg are actively monitored. Any questions that are coming out during midterms and finals and are posted to an online service will be searched. Such an activity will be considered as a scholastic offence and will result in academic penalty.

8. Support Services

Please visit the Science & Basic Medical Sciences Academic Counselling webpage for information on add/drop 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 Student Accessibility Services (SAS) at (519) 661-2147 if you have any questions regarding accommodations.

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/>.

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/mental_health) 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>.

Chapter	Textbook Exercises
1	1, 5, 13, 15, 17, 28, 29, 40
2	4, 8, 10, 12, 15, 17, 19, 21, 23, 29, 33, 36, 41
3	1, 3, 7, 9, 11, 13, 26, 29, 30, 35, 36, 37, 38
4	1, 3, 8, 11, 13, 21, 23, 31, 36, 39, 44
5	1, 4(a), 5, 7, 9, 16, 30, 31, 34, 35, 37, 43, 48, 52, 55, 59
6	1, 6, 18, 19, 20, 22, 24, 25, 31, 32
7	Self-review chapter.
8	1, 3, 17, 18, 19, 20, 21, 24, 36, 38, 42, 45, 49
9	1, 2, 4, 10, 11, 15, 16, 19, 26, 27, 28, 35, 37, 46, 47, 48
10	1, 11, 13
11	Self-review chapter.
12	1, 2, 5, 8, 12, 13, 15, 17, 18, 34, 36, 37, 41, 47, 48, 51, 52
13	1, 2, 3, 4, 5, 6, 7, 8, 9, 11, 27, 28, 32, 34, 38, 39
14	1, 5, 10, 12, 26, 27, 28, 29, 33, 34, 35
15	1, 5, 7, 9, 11, 12, 13, 19, 22, 23, 26, 28
16	1, 3, 6, 8, 9, 10, 15, 16, 18, 21, 23, 32, 33, 38, 39, 42, 44
17	3, 6, 8, 13, 18, 24, 34, 35, 37
18	Self-review chapter.
19	1, 2, 3, 4, 6, 7, 8, 9, 21, 23, 24, 25, 26, 31, 33, 39
20	1, 2, 3, 4, 5, 10, 12, 18, 19, 20, 21, 29, 30, 31
21	1, 4, 5, 7, 11, 12, 20, 21, 22, 26, 34, 35, 37, 39