

**The University of Western Ontario
Department of Statistical and Actuarial Sciences**

1. Course Information

Course Information

Statistical Science 2141: *Applied Probability and Statistics for Engineers*

Prerequisite(s)

Applied Mathematics 1413, or either Calculus 1000A/B or 1100A/B plus either Calculus 1301A/B or 1501A/B. Applied Mathematics 1413 (026), or either Calculus 1000A/B or 1100A/B (050a/b) plus either Calculus 1301A/B (051a/b) or 1501A/B (081a/b).

Anti-requisite(s)

All other courses or half courses in Introductory Statistics except for Statistical Sciences 1023A/B, Statistical Sciences 1024A/B. All other courses or half courses in Introductory Statistics except for Statistical Sciences 1023A/B, Statistical Sciences 1024A/B.

Students are responsible to ensure that they possess the necessary prerequisites (or have written special permission) and that de-registration may occur at any time if they lack the prerequisite or have taken an anti-requisite course. 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. Course Information

Instructor: Katsu Goda
Email: kgoda2@uwo.ca
Lecture Hours: Not applicable, **asynchronous lectures**; presentation videos will be posted weekly on OWL
Online Office Hours: Mondays, Wednesdays, and Fridays, 1:30 PM-2:30 PM (Zoom link will be provided on OWL website)
Teaching Assistants: Aoyko, Andrew (aboyko4@uwo.ca), Cui, Jingyu (jcui92@uwo.ca), Deng, Gansen (gdeng7@uwo.ca), Faroughi, Pouya (pfarough@uwo.ca), Li, Yuying (yli2982@uwo.ca)

Students must use their Western (@uwo.ca) email addresses when contacting their instructors.

3. Course Syllabus, Schedule, and Delivery Mode

Course Description

An introduction to statistics with emphasis on the applied probability models used in Electrical and Civil and Environmental Engineering and elsewhere. Topics covered include samples, probability, probability distributions, estimation (including comparison of means), correlation and regression. Cannot be taken for credit in any 3-year or honors program or in any module in Statistics, Actuarial Science, or Financial Modelling.

Learning Outcomes

At the end of the course, students should be able to:

- state fundamental concepts of applied probability and statistics,
- see how the concepts are related and interact with each other,
- decide where and under what circumstances a given concept is applicable,
- combine the concepts to produce solutions for real-life problems,
- make appropriate inferences and decisions.

Type	Mode	Dates	Time	Frequency
Lecture	Asynchronous online	N/A	3 hours/sessions	weekly
Office hours/Questions and answers	Synchronous online	M/W/F	1:30 – 2:30 pm	weekly

4. Course Materials

Text Books

- *Probability and Statistics for Engineers and Scientists, 4th ed.*, by A. Hayter (**main**)
- *MATLAB Recipes for Earth Sciences* by M. Trauth (electronic book is available via Western Libraries; <http://link.springer.com/book/10.1007%2F978-3-662-46244-7>)
- *Statistics and Probability Theory* by M.H. Faber (electronic book is available via Western Libraries; <https://link.springer.com/book/10.1007%2F978-94-007-4056-3>)

Course Outline

Chapter of the main text book	Topics
1 – Probability theory	Probabilities, Events, Union, Intersection, Conditional Probability, Bayes Rule
2 – Random variables	Discrete and Continuous Random Variables, Expectation, Variance, Combinations, Functions of Random Variables
3 – Discrete probability distributions	Binomial, Poisson, Negative Binomial
4 – Continuous probability distributions	Uniform, Exponential, Gamma
5 – Normal distributions	Normal Curve Calculation, Linear Combinations, Normal Approximation to Binomial, Related Distributions
6 – Descriptive statistics	Graphing Data, Sample Statistics: Mean, Median, Variance, IQR, Percentiles, Outliers
7 – Statistical estimation and sampling distributions	Point Estimates, Sampling Distributions
8 – Inference about a population mean	One Sample Hypothesis Testing and Confidence Intervals
9 – Inference about two population means	Two Sample Hypothesis Testing and Confidence Intervals
12 – Simple linear regression and correlation	Regression, Inferences About Slope, Prediction Intervals, Coefficient of Determination, Residual Analysis, Correlation Analysis
16 – Quality control methods	Statistical Process Control, Variable Control Methods

Course Schedule

Week	Topics
Week1 (Sept 7 -)	Briefing
Week2 (Sept 14 -)	Chapter 6 (Sessions 1 & 2) and MATLAB (Session 3)
Week3 (Sept 21 -)	Chapter 1 (Sessions 4-6)
Week4 (Sept 28 -)	Chapter 2 (Sessions 7 and 8)
Week5 (Oct 5 -)	Chapter 2 (Sessions 9 and 10)
Week6 (Oct 12 -)	Chapter 3 (Sessions 11 and 12) and Chapter 4 (Session 13)
Week7 (Oct 19 -)	Chapter 5 (Sessions 13 and 15) and Monte Carlo methods (Session 16)
Week8 (Oct 26 -)	Review 1 and Midterm
Fall reading week (Nov 2-8)	
Week9 (Nov 9 -)	Chapter 7 (Sessions 17-19)
Week10 (Nov 16 -)	Chapter 8 (Sessions 20 and 21) and Chapter 9 (Session 22)
Week11 (Nov 23 -)	Chapter 9 (Session 23) and Chapter 12 (Sessions 24 and 25)
Week12 (Nov 30 -)	Chapter 12 (Session 26) and Chapter 16 (Sessions 27 and 28)
Week13 (Dec 7 -)	Review 2
Final Exam	

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.

5. Methods of Evaluation

Evaluation

The overall course grade will be calculated as listed below:

Mid-term Online Exam: 30%, October (tentative, as scheduled by the Registrar)

Final Online Exam: 70%, December (tentative, as scheduled by the Registrar)

The mid-term test will cover the textbook chapters 1 to 6. The final exam will cover the textbook chapters 1 to 9, 12, and 16.

There will be no make-up exam for a missed midterm. The weight of a missed test will be transferred to the final exam. If a make-up final assessment is missed, the student will receive an INC and complete the exam the next time the course is offered.

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 Academic Accommodation for Students with Disabilities policy can be found at: https://www.uwo.ca/univsec/pdf/academic_policies/appeals/Academic_Accommodation_disabilities.pdf.

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 semester, 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
- 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 policy on Academic Consideration for Student Absences - Undergraduate Students in First Entry Programs, see:

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

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

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.

Contingency plan for an in-person class pivoting to 100% online learning

In the event of a COVID-19 resurgence during the course that necessitates the course delivery moving away from face-to-face interaction, all remaining course content will be delivered entirely 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). The grading scheme will not change. Any remaining assessments will also be conducted online as determined by the course instructor.

All of the remote learning sessions for this course will be recorded.

The data captured during these recordings may include your image, voice recordings, chat logs and personal identifiers (name displayed on the screen). The recordings will be used for educational purposes related to this course, including evaluations. The recordings may be disclosed to other individuals participating in the course for their private or group study purposes. Please contact the instructor if you have any concerns related to session recordings.

Participants in this course are not permitted to record the sessions, except where recording is an approved accommodation, or the participant has the prior written permission of the instructor.

You will need a non-programmable calculator for all exams.

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, such as **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 on OWL
- 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
- All recorded sessions will remain within the course site or unlisted if streamed

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 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>.