Western Science

Department of Statistical and Actuarial Sciences

SS 2857A: Probability and Statistics I
Course Outline

1. Course Information

Course Information
Term: Fall 2022
Location: WSC-55
Lectures: Monday, Wednesday, Friday 12:30 – 1:20
Tutorials: Friday, 4:30 – 5:20

List of Prerequisites
0.5 course from Calculus 1000A/B, Calculus 1500A/B, or Applied Mathematics 1412A/B, each with a minimum mark of 60%, plus 0.5 course from Calculus 1301A/B (minimum mark 85%), Calculus 1501A/B (minimum mark 60%), or Applied Mathematics 1414A/B (minimum mark 60%). The former Applied Mathematics 1413 with a minimum mark of 60% may also be used to meet this 1.0 course prerequisite.

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

Instructors	Email	Office	Phone	Office Hours
Dr. Holly Steeves	Holly.steeves@uwo.ca	WSC 233	519-661-2111 x86426	MF 10:00 – 11:00 T 2:00 – 3:00
Yasin Khadem Charvadeh	ykhademc@uwo.ca			
Pramod Purigali Raghavendra Rao	ppurigal@uwo.ca			

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

Personal Teaching Approach
I believe that students learn best in an inclusive, welcoming environment that sparks questions, discussions and respect from all sides. For this reason, a typical class will involve a lecture period

discussing and explaining the material, broken up with non-graded check ins (through the use of iClicker) to assess student understanding. Examples will be used both as part of the lectures, and part of active learning, where the students get time to practice the problems themselves. In cases where feedback from the assessment is immediate (such as with iClicker), the lecture may be tailored to sections that were most misunderstood. I welcome relevant disruptions to this lecture period such as with questions or discussion topics. I encourage participation and discussions throughout the lectures, and the active learning components. Throughout all of these components, I strive to be respectful to all learners and their individual learning needs, and I expect you to do the same.

Instructor Policies
As mentioned above, I expect respect and inclusivity in our classroom. To promote this, I have several policies that you should follow:

- Please do not be late. If you must be, please enter quietly and choose a seat closest to the door to limit the disruption.
- Put your phones on silent and refrain from being on them. If you must answer your phone, immediately and quietly leave the room. I understand there are sometimes emergencies, but this should not disrupt other students.
- Treat others as you would like to be treated. When speaking for the first time in a new group, introduce yourself with your name, and pronouns if you feel comfortable. Do not judge others for their work in this class, their questions, or anything they choose to share.
- When others are speaking, whether it be instructor or student, listen and do not speak over them.
- Please allow 24 hours for a response via email. I will not be answering emails in the evenings, weekends, or holidays, but I will get back to you as soon as possible. The same should be expected of your peers.

3. Course Syllabus, Schedule, Delivery Mode

Course Description
Probability axioms, conditional probability, Bayes' theorem. Random variables motivated by real data and examples. Parametric univariate models as data reduction and description strategies. Multivariate distributions, expectation and variance. Likelihood function will be defined and exploited as a means of estimating parameters in certain simple situations.

The introduction to statistics side of the course will begin with descriptive statistics, that is, summarizing and describing the data at hand. We will discuss graphs and numerical summaries to display the data and describing what is depicted.

The introduction to probability side of the course will go over the basics of probability: the laws of probability, axioms of probability, conditional probability and Bayes' theorem. This leads us into random variables and probability distributions, which are the foundations upon which data modelling is built. This will provide you with the basics you need for any mid to high level statistics course you may be itching to take. We will specifically look at descriptive statistics, probability, continuous and discrete random variables, continuous and discrete probability distributions, joint probability distributions and sampling distributions.

Learning Outcomes

By the end of this course, students will be able to

- Summarize data with the use of graphs and numerical summaries, and describe characteristics of the data.
- Define probability and use the axioms, rules, and counting techniques to solve for probabilities.
- Define random variables and describe their probability distributions, solving for expected values, moment generating functions, and variances as needed.
- Solve for expected values, covariance, and correlation of jointly distributed random variables.
- Define sampling distributions and solve for the sampling distribution of the sample mean.

Key Sessional Dates listed below for your course
Classes begin: September 8, 2022; January 9, 2023
Fall Reading Week: October 31 – November 6, 2022; February 18 – 26, 2023
Classes end: December 8, 2022; April 10, 2023
Exam period: December 10 – 22, 2022; April 13 – 30, 2023

Week	Dates	Section	Tutorial	Assignment
1	Sept 9	Course Intro		
2	Sept 12	1.1 1.2		
	Sept 14	1.3		
	Sept 16	1.4		
3	Sept 19	2.1		
	Sept 21	2.2		
	Sept 23	2.3	Review: Chapter 1	
4	Sept 26	2.4		
	Sept 28	2.5		
	Sept 30	2.5	Quiz: Chapter 1	Assignment 1 Due
5	Oct 3	3.1		
	Oct 5	3.2		
	Oct 7	3.3	Review: Chapter 2	
6	Oct 12	3.4		
	Oct 14	3.5	Quiz: Chapter 2	Assignment 2 Due
7	Oct 17	3.6		
	Oct 19	3.7		
	Oct 21	3.7	Review: Chapter 3	
8	Oct 24	4.1		
	Oct 26	4.2		
	Oct 28	4.3	Quiz: Chapter 3	Assignment 3 Due
9	Reading Week			
10	Nov 7	4.4		
	Nov 9	4.6		
	Nov 11	4.7	Review: Chapter 4	
11	Nov 14	5.1		
	Nov 16	5.2		

	Nov 18	5.3	Quiz: Chapter 4	Assignment 4 Due
12	Nov 21	6.1		
	Nov 23	6.2		
	Nov 25	6.3	Review: Chapter 5	
13	Nov 28	Catch up		
	Nov 30	Review: Chapter 6		
	Dec 2	Exam Review	Quiz: Chapter 5	Assignment 5 Due
14	Dec 5	Exam Review		
	Dec 7	Quiz: Chapter 6		

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, affected 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.

4. Course Materials

The required text for this course is:
Devore, JL and Berk, KN (2012) Modern Mathematical Statistics with Applications. 2nd Edition. Springer.

You may access a free electronic copy of this book in PDF or EPUB format through Western Libraries by following this link to Springer Link. From there you can also purchase a softcover copy of the book if you prefer.

We will cover most of Chapters 1 through 6 in the text except for the sections which rely on multivariate calculus.

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.

5. Methods of Evaluation

The overall course grade will be calculated as listed below:

Assignments (5)	20%
Quizzes (6)	15%
Midterm Test	25%
Final Exam	40%

Assessment Descriptions

- **Assignments will be available on the course OWL site. However, you will not submit your solutions to OWL. Instead, assignments must be submitted through Gradescope** (https://www.gradescope.com/) an online collaborative grading system. It is your responsibility to make sure that your assignment is successfully uploaded and legible. Submissions that cannot be read by the grader will receive a grade of zero.

- After receiving the grades from an assignment, **students will have seven days to submit any regrade requests on that assignment**. After this seven-day period, regrade requests will NOT be accepted. Regrade requests must be made using the Gradescope tool "Regrade Request".

- **Assignment submissions are due 11:55 pm (Eastern Time) on the due date**. Assignments that are up to 24 hours late will receive a deduction of 15% on their mark. Late assignments up to 48 will receive a deduction of 30% on their mark hours that. No credit will be given for submissions beyond 48 hours of the deadline time unless a valid academic accommodation is obtained.

- Solutions to assignments **will not** be posted; however, TAs will provide comments on incorrect answers using Gradescope, which will allow students to find out the correct solutions. In addition, students can ask the instructor and TAs for more details on solutions via the Regrade Request tool on Gradescope and during office hours.

- **Quizzes** will be done in the tutorial time with the exception of quiz 6 which will be done in class time. See schedule for specifics. You will be graded on your best 5 out of 6 quizzes. For each quiz, you will be allowed **one half page, one sided, letter sized, handwritten cheat sheet.** If any violations are seen in the cheat sheet, it will be taken from you.

- **Final Exam and Midterm** will both be booked by the registrar's office, so date and time is to be determined. Both will be closed book. For the midterm you will be allowed **one single sided, letter sized, handwritten cheat sheet.** For the final, you will be allowed **one double sided, handwritten, letter sized cheat sheet.** Again, any violations seen on the cheat sheet and it will be taken from you.

6. Student Absences

If you are unable to meet a course requirement due to illness or other serious circumstances, please follow the procedures below.

Assessments worth less than 10% of the overall course grade:

Please contain your Dean's Office Academic Counselling unit as soon as possible. When I get word that your absence has been approved, the weight will be shifted into the remaining of the category. For example, if you missed an assignment, instead of each assignment being worth 3.5%, each assignment will be worth 4.25%.

Assessments worth 10% or more of the overall course grade:

For work totalling 10% or more of the final course grade, you 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.

If the midterm exam is missed, the weight will be shifted towards the final exam.

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).

Note: missed work can *only* be excused through one of the mechanisms above. Being asked not to attend an in-person course requirement due to potential COVID-19 symptoms is **not** sufficient on its own.

6. Accommodation and Accessibility

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.

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.

7. 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 their official university address is attended to in a timely manner.

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

Online services such as Chegg are actively monitored. Any questions that are coming out from assignments and are posted to an online service will be searched. Such an activity will be considered as a scholastic offence and will result in an academic penalty.

A scientific calculator will be allowed on the midterm and final exam. A graphics calculator will not 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: http://www.uwo.ca/univsec/pdf/academic_policies/appeals/scholastic_discipline_undergrad.pdf.

Clickers, specifically iClicker will be used in this class for instant feedback and non-graded assessments. Clickers will not be used for any marks towards the course.

8. 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/.

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 the Student Development Centre (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/.

University Accreditation Program – Canadian Institute of Actuaries (CIA)

Honours Specialization Program in Actuarial Science

If you are in 2nd or 3rd year

If you graduate from with an HSP in Actuarial Science, this course will be one of the courses that you will take in your program that will allow you to be exempt from the preliminary exams of the Society of Actuaries (SOA). This is under the new **CIA program accreditation program.** If your plan is to become a fully qualified actuary working in Canada, then all you would need to do is graduate from your HSP in actuarial science. You would then be eligible for the CIA Capstone Exam. Taking and passing this exam, along with an online module and a practice education course, would make you eligible to become an ACIA (associate of the Canadian Institute of Actuaries).

If you are in 4th year

This course is accredited under the Canadian Institute of Actuaries (CIA) University Course Accreditation Program (UAP) for the 2022-23 academic year. Achievement of the established exemption grade in this course may qualify a student from exemptions from writing certain preliminary exams. **This is the last year of the CIA course accreditation program.**

Major in Actuarial Science

If you are a student in a major in Actuarial Science, the CIA program accreditation program will not apply to you. If your plan is to become a fully qualified actuary, you will need to continue to write and pass the preliminary exams of the SOA. However, for 2022-23 this course is still accredited under the Canadian Institute of Actuaries (CIA) University Course Accreditation Program (UAP) for the 2022-23 academic year. Achievement of the established exemption grade in this course may qualify a student from exemptions from writing certain preliminary exams. **This is the last year of the CIA course accreditation program.**

Please see the following link for full details:

http://www.cia-ica.ca/membership/university-accreditation-program---home

In addition to the university's internal policies on conduct, including academic misconduct, candidates pursuing credits for writing professional examinations shall also be subject to the **Code of Conduct and Ethics for Candidates in the CIA Education System** and the associated **Policy on Conduct and Ethics for Candidates in the CIA Education System**.

https://www.cia-ica.ca/docs/default-source/2020/220065e.pdf