UNIVERSITY OF CALGARY
FACULTY OF SCIENCE

Department of Mathematics & Statistics
MS 476
403 220-5210
math@ucalgary.ca

COURSE OUTLINE

1. **Course:** STAT 321, Introduction to Probability - Fall 2022

   Lecture 01 : MWF 10:00 - 10:50 in EEEL 161

Instructor	Email	Phone	Office	Hours
Scott Robison	sarobiso@ucalgary.ca	N/A	MS 590	Via Discussion Boards

To account for any necessary transition to remote learning for the current semester, courses with in-person lectures, labs, or tutorials may be shifted to remote delivery for a certain period of time. In addition, adjustments may be made to the modality and format of assessments and deadlines, as well as to other course components and/or requirements, so that all coursework tasks are in line with the necessary and evolving health precautions for all involved (students and staff).

In Person Delivery Details:

Lectures will be held in-person so long as it makes sense to do so. As you will read, efforts will be made to be as flexible as possible for those who cannot join in-person.

Office hours may be held in-person or if held via zoom (and will be recorded and posted). Office hour(s) availability may be subject to changing modalities and schedules contingent on the holders health, comfort, and circumstances.

Re-Entry Protocol for Labs and Classrooms:

To limit the spread of COVID-19 on campus, the University of Calgary has implemented safety measures to ensure the campus is a safe and welcoming space for students, faculty and staff. The most current safety information for campus can be found here. **Online Delivery Details:**

Some aspects of this course are being offered in real-time via scheduled meeting times. For those aspects you are required to be online at the same time.

To help ensure Zoom sessions are private, do not share the Zoom link or password with others, or on any social media platforms. Zoom links and passwords are only intended for students registered in the course. Zoom recordings and materials presented in Zoom, including any teaching materials, must not be shared, distributed or published without the instructor’s permission.

This course has a registrar scheduled, synchronous final exam. The writing time is 2 hours + 50% buffer time.

Course Materials including: readings, notebooks, videos, and R-Studio software code etc. will be posted via the D2L course website. Although, students are not required to be online simultaneously (synchronously) it will be required that students view/complete all scheduled course components on the same day that they are assigned (reference the D2L calendar for details). These materials are previously recorded (not new) and to be considered **supplementary**; in-person lecture attendance is encouraged/preferred when plausible, however, students (and members of the teaching team) should stay home if ill.

Asking Questions: many students will have additional questions, especially regarding assignment problems or course content. These questions should be asked on the relevant **Discussion Boards** on D2L, where Instructors, TA's, and peers can contribute and curate answer(s) to these questions centralizing, reducing duplication, and improving answer consistency.

Conversations of a personal or private nature may be conducted through email, and we will make every effort to respond in a timely manner within one working day. We ask for your patience, professionalism, and respect during communication.

Academic integrity is the foundation of the development and acquisition of knowledge and is based on values of honesty, trust, responsibility, and respect. We expect members of our community to act with integrity. Research integrity, ethics, and principles of conduct are key to academic integrity. Members of our campus community are required to abide by our institutional code of conduct and promote academic integrity in upholding the University of Calgary’s reputation of excellence.

Course Site:

Note: Students must use their U of C account for all course correspondence.

Any material that is posted of the D2L website is under copyright protection, students are not permitted to redistribute any of the material they find there to anyone not in this semester's class.

Any material that is posted on D2L is subject to be taken down within two weeks of the posted date, so do not use D2L as your digital storage space. Do not expect that you will have access to the D2L page beyond the End of Classes date (Dec. 7, 2022). Download any material you would like to your personal devices before they are removed from the website.

Equity Diversity & Inclusion:

The University of Calgary is committed to creating an equitable, diverse and inclusive campus, and condemns harm and discrimination of any form. We value all persons regardless of their race, gender, ethnicity, age, LGBTQIA2S+ identity and expression, disability, religion, spirituality, and socioeconomic status. The Faculty of Science strives to extend these values in every aspect of our courses, research, and teachings to better promote academic excellence and foster belonging for all.

2. **Requisites:**

See section 3.5.C in the Faculty of Science section of the online Calendar.

Prerequisite(s):
Mathematics 267 or 277.

Antirequisite(s):
Credit for Statistics 321 and Engineering 319 will not be allowed.

Note(s):

a. Statistics 205, 213, 217, and 327 are not available to students who have previous credit for one of Statistics 321, Engineering 319 or Digital Engineering 319 or are concurrently enrolled in Statistics 321, Engineering 319 or Digital Engineering 319.

3. **Grading:**

The University policy on grading and related matters is described in F.1 and F.2 of the online University Calendar.

In determining the overall grade in the course the following weights will be used:

Course Component	Weight	Due Date (duration for exams)	Modality for exams	Location for exams
Practice Quizzes (*best 4 of 5)[1]	15%	Ongoing		
Quizzes (*best 4 of 5 will count)[2]	40%	Ongoing		
Peer Assessments	10%	Ongoing		
Registrar Scheduled Final Exam	35%	Will be available when the final exam schedule is released by the Registrar	online	Will be available when the final exam schedule is released by the Registrar

[1] Pre Quizzes may be written in-person in labs or online with a 50% time buffer. Pre Quiz 1: Sept 22, Pre Quiz 2: Oct 6, Pre Quiz 3: Oct 20, Pre Quiz 4: Nov 3, Pre Quiz 5: Nov 24.

[2] Quizzes may be written in-person in labs or online with a 50% time buffer. Quiz 1: Sept 29, Quiz 2: Oct 13, Quiz 3: Oct 27, Quiz 4: Nov 17, Quiz 5: Dec 1.

Each piece of work (reports, assignments, quizzes, midterm exam(s) or final examination) submitted by the student will be assigned a grade. The student's grade for each component listed above will be combined with the indicated weights to produce an overall percentage for the course, which will be used to determine the course letter grade.

The conversion between a percentage grade and letter grade is as follows.

	A+	A	A-	B+	B	B-	C+	C	C-	D+	D
Minimum % Required	95 %	90 %	85 %	80%	75%	70 %	65 %	60%	55%	54.99 %	50 %

This course will have a Registrar Scheduled Final exam that will be delivered on-line. The Final Examination Schedule will be published by the Registrar's Office approximately one month after the start of the term. The final exam for this course will be designed to be completed within 2 hours.

Per section G.5 of the online Academic Calendar, timed final exams administered using an on-line platform, such as D2L, will be available on the platform. Due to the scheduling of the final exams, the additional time will be added to **the end** of the registrar scheduled **synchronous** exam to support students. This way, your exam schedule accurately reflects the **start time** of the exam for any **synchronous** exams. E.g. If a **synchronous** exam is designed for 2 hours and the final exam is scheduled from 9-11am in your student centre, the additional time will be added to the **end** time of the **synchronous** exam. This means that if the exam has a 1 hour buffer time, a synchronous exam would start at 9 am and finish at 12pm.

*If these any dates cannot work for you please arrange (sarobiso@ucalgary.ca) an alternate time to write these exams **prior (at least one week) to the date(s) in question.** Of course, valid reasons will be accommodated, however, simple matters of preference will not be accommodated.

In the event that a student legitimately fails to submit any assessment on time (e.g. due to illness etc...), please contact the course instructor **within 48 hours of the due date! if this course does not have a coordinator to arrange for a re-adjustment of a submission date. Absences not reported within 48 hours will not be accommodated.

***After any quiz a re-write option will be made digitally available. If desired, the student may re-write all or any portion of the original quiz, however, the **re-writes will only be eligible for up to 70% of the original score.** The re-write will only be digitally graded without part marking options and once any re-write is submitted its score will replace the original quiz(zes') grade. Re-writes will be open/available on the Sunday(s) after their respective original quiz(zes'). Re-writes are encouraged to be considered open book, but will need to be completed individually without another's assistance.

****The final exam will have a similar re-write option as described for the quizzes, however, the date cannot yet be determined.

*****If Quiz(zes) or Practice Quiz(zes) is/are missing they will count as the assessment(s) that do not count. If more than 1 (respectively) are unaccounted for, scores of 0% will be inputted in as the assessment(s) that do count.

The University of Calgary offers a flexible grade option, Credit Granted (CG) to support student's breadth of learning and student wellness. Faculty units may have additional requirements or restrictions for the use of the CG grade at the faculty, degree or program level. To see the full list of Faculty of Science courses where CG is not eligible, please visit the following website: https://science.ucalgary.ca/current-students/undergraduate/program-advising/flexible-grading-option-cg-grade

4. **Missed Components Of Term Work:**

   The university has suspended the requirement for students to provide evidence for absences. Please do not attend medical clinics for medical notes or Commissioners for Oaths for statutory declarations.

   In the event that a student legitimately fails to submit any online assessment on time (e.g. due to illness etc...), please contact the course coordinator, or the course instructor if this course does not have a coordinator to arrange for a re-adjustment of a submission date. Absences not reported within 48 hours will not be accommodated. If an excused absence is approved, one possible arrangement is that the percentage weight of the legitimately missed assignment could also be pro-rated among the components of the course. This option is at the discretion of the coordinator and may not be a viable option based on the design of this course.

   It is **your** job to communicate clearly with your instructor **before** (if possible) or **directly after (<48 hours) crisis or extenuating circumstance has occurred.** Simply missing or not being aware of time (time zones) is not a valid justification. This includes: any **course conflicts** or **work schedules** etc.

5. **Scheduled Out-of-Class Activities:**

   There are no scheduled out of class activities for this course.

6. **Course Materials:**

   Recommended Textbook(s):

   Wackerly, Mendenhall, Scheaffer, *Mathematical Statistics with Applications 7E*: Cengage Learning / Nelson.

   In order to successfully engage in their learning experiences at the University of Calgary, students taking online, remote and blended courses are required to have reliable access to the following technology:

   - A computer with a supported operating system, as well as the latest security, and malware updates;

- A current and updated web browser;
- Webcam/Camera (built-in or external);
- Microphone and speaker (built-in or external), or headset with microphone;
- Current antivirus and/or firewall software enabled;
- Stable internet connection.

For more information please refer to the UofC ELearning online website.

7. **Examination Policy:**

Canadian Institute of Actuaries Ethics: In addition to the university's internal policies on conduct, including academic misconduct (Section K of the online calendar), 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. For more information, please visit Obtaining UAP Credits and the CIA FAQ

Students should also read the Calendar, Section G, on Examinations.

8. **Approved Mandatory And Optional Course Supplemental Fees:**

There are no mandatory or optional course supplemental fees for this course.

9. **Writing Across The Curriculum Statement:**

For all components of the course, in any written work, the quality of the student's writing (language, spelling, grammar, presentation etc.) can be a factor in the evaluation of the work. See also Section E.2 of the University Calendar.

For graded assessment work that is submitted via grade scope, you are expected to **show your supporting work** for full marks. Correct answers that fail to display **clear and concise** evidence and explanation of answers will not be given full credit.

Your work must be submitted correctly to the **Gradescope** and **WeBWorK** platforms to be eligible for any credit. Attempting to not submit on time (before deadlines, even if only second(s) late) will result in zero earned credit. Inability to submit/upload the assessments correctly will also result in zero credit.

Any submitted work must be **legible,** display an organized expected and **readable flow**, contain a consistent and **singular solution**. Any solutions that appear to contain multiple answers or attempt to commit to multiple inconsistent answers will result in zero credit. ex. trying to indicate both True and False; selecting A and B in multiple choice format; or Answers that contain both correct and incorrect answers the correct final answer must be **clearly be indicated** (with supporting work that lead to that response).

10. **Human Studies Statement:**

Students will not participate as subjects or researchers in human studies.

See also Section E.5 of the University Calendar.

11. **Reappraisal Of Grades:**

A student wishing a reappraisal, should first attempt to review the graded work with the Course coordinator/instructor or department offering the course. Students with sufficient academic grounds may request a reappraisal. Non-academic grounds are not relevant for grade reappraisals. Students should be aware that the grade being reappraised may be raised, lowered or remain the same. See Section I.3 of the University Calendar.

a. **Term Work:** The student should present their rationale as effectively and as fully as possible to the Course coordinator/instructor within **ten business days** of either being notified about the mark, or of the item's return to the class. If the student is not satisfied with the outcome, the student shall submit the Reappraisal of Graded Term work form to the department in which the course is offered within 2 business days of receiving the decision from the instructor. The Department will arrange for a reappraisal of the work within the next ten business days. The reappraisal will only be considered if the student provides a detailed rationale that outlines where and for what reason an error is suspected. See sections I.1 and I.2 of the University Calendar

b. **Final Exam:** The student shall submit the request to Enrolment Services. See Section I.3 of the University Calendar.

12. **Other Important Information For Students:**

a. **Mental Health** The University of Calgary recognizes the pivotal role that student mental health plays in

physical health, social connectedness and academic success, and aspires to create a caring and supportive campus community where individuals can freely talk about mental health and receive supports when needed. We encourage you to explore the mental health resources available throughout the university community, such as counselling, self-help resources, peer support or skills-building available through the SU Wellness Centre (Room 370, MacEwan Student Centre, Mental Health Services Website) and the Campus Mental Health Strategy website (Mental Health).

b. **SU Wellness Services:** For more information, see their website or call 403-210-9355.

c. **Sexual Violence:** The Sexual Violence Support Advocate, Carla Bertsch, can provide confidential support and information regarding sexual violence to all members of the university community. Carla can be reached by email (svsa@ucalgary.ca) or phone at 403-220-2208. The complete University of Calgary policy on sexual violence can be viewed here.

d. **Misconduct:** Academic integrity is the foundation of the development and acquisition of knowledge and is based on values of honesty, trust, responsibility, and respect. We expect members of our community to act with integrity. Research integrity, ethics, and principles of conduct are key to academic integrity. Members of our campus community are required to abide by our institutional Code of Conduct and promote academic integrity in upholding the University of Calgary's reputation of excellence. Some examples of academic misconduct include but are not limited to: posting course material to online platforms or file sharing without the course instructor's consent; submitting or presenting work as if it were the student's own work; submitting or presenting work in one course which has also been submitted in another course without the instructor's permission; borrowing experimental values from others without the instructor's approval; falsification/fabrication of experimental values in a report. Please read the following to inform yourself more on academic integrity:

   Student Handbook on Academic Integrity
   Student Academic Misconduct Policy and Procedure
   Faculty of Science Academic Misconduct Process
   Research Integrity Policy

   Additional information is available on the Student Success Centre Academic Integrity page

e. **Academic Accommodation Policy:**

   It is the student's responsibility to request academic accommodations according to the University policies and procedures listed below. The student accommodation policy can be found at: https://www.ucalgary.ca/legal-services/sites/default/files/teams/1/Policies-Student-Accommodation-Policy.pdf

   Students needing an accommodation because of a disability or medical condition should communicate this need to Student Accessibility Services in accordance with the Procedure for Accommodations for Students with Disabilities: https://www.ucalgary.ca/legal-services/sites/default/files/teams/1/Policies-Accommodation-for-Students-with-Disabilities-Procedure.pdf.

   Students needing an accommodation in relation to their coursework or to fulfil requirements for a graduate degree, based on a Protected Ground other than Disability, should communicate this need, by filling out the Request for Academic Accommodation Form and sending it to Mark Bauer by email bauerm@ucalgary.ca preferably 10 business days before the due date of an assessment or scheduled absence.

f. **Freedom of Information and Privacy:** This course is conducted in accordance with the Freedom of Information and Protection of Privacy Act (FOIPP). Students should identify themselves on all written work by placing their name on the front page and their ID number on each subsequent page. For more information, see Legal Services website.

g. **Student Union Information:** SU contact, Email SU Science Rep: sciencerep1@su.ucalgary.ca, Student Ombudsman

h. **Surveys:** At the University of Calgary, feedback through the Universal Student Ratings of Instruction (USRI) survey and the Faculty of Science Teaching Feedback form provides valuable information to help with evaluating instruction, enhancing learning and teaching, and selecting courses. Your responses make a difference - please participate in these surveys.

i. **Copyright of Course Materials:** All course materials (including those posted on the course D2L site, a course website, or used in any teaching activity such as (but not limited to) examinations, quizzes, assignments, laboratory manuals, lecture slides or lecture materials and other course notes) are protected by law. These materials are for the sole use of students registered in this course and must not be redistributed. Sharing these materials with anyone else would be a breach of the terms and conditions governing student

access to D2L, as well as a violation of the copyright in these materials, and may be pursued as a case of student academic or non-academic misconduct, in addition to any other remedies available at law.

Course Outcomes:

- Define a random experiment; conceptualize its sample space and the various events the random experiment could produce.
- Apply various laws of probability to solve probability problems that are framed in both theoretical and applied contexts
- Read, replicate, and create mathematical proofs of probability theorems covered in the course
- Recognition of quantification of random events through the creation of a random variable ; employment of probability foundations to design a probability model of a random variable
- Differentiation between discrete and continuous random variables, analysis of the random variable' s properties through an examination of its distribution shape, its measure of centre (mean/expected value), and its measure of spread (variance or standard deviation)
- Derivation of a moment generation function and subsequent employment of calculus methods to compute the moments of a random variable.
- Differentiate between when to apply the various probability models covered in the course (Bernoulli, Binomial, Negative Binomial, Geometric, Hypergeometric, Poisson, Normal, Gamma and its special cases (Chi -square and Exponential)). In addition, demonstrate application of such probability models to compute probabilities
- Recognize the synergies between two random variables through the visualization of their joint probability distribution function and its employment to compute simultaneous probabilities and derive conditional distribution functions
- Distinguish between dependence and independence of a pair of random variables and compute the covariance between the random variables.
- Statement and application of the Central Limit Theorem to both the sample mean and the sample proportion in order to consider the probable (and improbable) values of these statistics

Electronically Approved - Sep 01 2022 16:39

Department Approval

Electronically Approved - Sep 01 2022 22:36

Associate Dean's Approval