UNIVERSITY OF CALGARY
FACULTY OF SCIENCE

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

COURSE OUTLINE

1. **Course:** STAT 323, Introduction to Theoretical Statistics - Winter 2024

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

Instructor	Email	Phone	Office	Hours
Danika Lipman	danika.lipman@ucalgary.ca	TBA	MS 450	MT:11-12

   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.

   Tutorials will be in person.

   Course Site:

   D2L: STAT 323 L01-(Winter 2024)-Introduction to Theoretical Statistics

   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 (Apr. 9, 2024). 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):
   Statistics 321.

   Antirequisite(s):
   Credit for Statistics 323 and Data Science 305 will not be allowed.

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
Pre-Quizzes (5)[1]	15%	Ongoing		
Quizzes (5)[2]	20%	Ongoing		
Assignments (5)[3]	25%	Ongoing		
Registrar Scheduled Final Exam	40%	Will be available when the final exam schedule is released by the Registrar	in person	Will be available when the final exam schedule is released by the Registrar

[1] Prequizzes will be available via gradescope from 12:01am to 11:59pm on the following days: Jan 31, Feb 14, Mar 6, Mar 20, Apr 3. These are the days prior to the quizzes that will be written in lab. Each prequiz is worth 3% and must be submitted to gradescope before the deadline to be marked.

[2] Quizzes will be held in person in your registered lab. Each quiz is worth 4% and has an accompanying prequiz that can be written the day prior to the actual quiz. Each quiz will be 25 minutes in the latter half of the lab. Quizzes will be closed book, and you may only access Rstudio. The first 25 minutes will be used to review any problems from the prequiz. The dates of the quizzes are Feb 1, Feb 15, Mar 7, Mar 21, Apr 4

[3] Assignments are each 5% and will be due via gradescope on the following days: Feb 4, Feb 18, Mar 10, Mar 24, April 7, at 11:59pm. They can either be typed up or neatly handwritten for submission. Submit R files to the D2L dropbox, and pdfs to gradescope. Code must be able to run if applicable. It is the responsibility of the student to ensure that the scans/pictures are uploaded correctly. That is, the student must ensure that the scans/pictures are readable and are uploaded in the correct orientation (so that the scans/pictures do not need to be rotated in order to be read and graded). Assignments are permitted to be handed in groups (3 max) or individually. Groups can be changed or re-formed from assignment to assignment. Only one submission for the group is permitted and all members of the group must be clearly labeled on the front page. Each member of the group will receive the same grade as the other group members. In the event a group larger than 3 submits an assignment, all members will receive 0.

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 in-person and on campus. 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.

*If these any dates cannot work for you please arrange (danika.lipman@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! Absences not reported within 48 hours will not be accommodated.

***If any assessments is/are missing and unaccounted for they will be graded as zeros.

****Any grade appeals after 14 days from initial grade posting, will be denied.

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:**

In the event that a student legitimately fails to submit any online or in-person assessment on time (e.g. due to illness, domestic affliction, 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, or possible exemption and reweighing of components. Absences not reported within 48 hours will not be accommodated. Students may be asked to provide supporting documentation (Section M.1) for an excused absence, See FAQ.

If an excused absence is approved, options for how the missed assessment is dealt with is at the discretion of the coordinator or course instructor. Some options such as an exemption and pro-rating among the components of the course 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 - documentation will be required.** 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:**

   Required Textbook(s):

   Wackerly, *Mathematical Statistics with Applications 7e*: Duxbury Pr..

   R and RStudio: students will make use of R statistical software throughout the course.

   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:**

   No aids are allowed on tests or examinations. Only R studio can be used. Any requests to for a deferred exam must be submitted within 48 hours of the exam date.

   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, 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 **DROPBOX** 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. Regardless of typos or what was "meant to be submitted" all that can be graded is what was actually submitted. This, unfortunately, includes if time limits or other errors were incurred resulting in blanks being submitted on behalf of the student.

   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). This applies to cumulative answers that appear to "change consistency" at some point of the response. How the question is started will be given precedence in the event of inconsistencies.

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 a s 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.

Grade appeals must be submitted to the Teaching Assistant (TA) of their registered lab. If the TA agrees they may pass on the record of the account to the instructor of record.

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. **Student Ombuds Office:** A safe place for all students of the University of Calgary to discuss student related issues, interpersonal conflict, academic and non-academic concerns, and many other problems.

e. **Student Union Information:** SU contact, Email your SU Science Reps: science1@su.ucalgary.ca, science2@su.ucalgary.ca, science3@su.ucalgary.ca,

f. **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 Jerrod Smith by email jerrod.smith@ucalgary.ca preferably 10 business days before the due date of an assessment or scheduled absence.

g. **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

h. **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.

i. **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.

j. **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.

Course Outcomes:

- Identify a target population and its corresponding target parameter
- Apply the method of moments and maximum likelihood estimation to derive a statistic to estimate a target parameter
- Derive the probability distribution of a statistic and compute both its mean, is variance or standard deviation, and its bias.
- Evaluate the large -sample merits of a statistic based on its (i) biased/unbiasedness and (ii) its consistency/lack of consistency, to determine its usefulness
- Read, replicate, and create mathematical proofs of statistical theorems covered in the course
- Recognize parameter estimation through the application of the pivotal quantity method to create a confidence interval for the unknown value of a population parameter. This is to include parametric estimation of the mean, proportion, variance, difference of two means, difference of two proportions, and ratio of variances.
- Comprehend the scientific method of statistical hypothesis testing. This is to include the derivation of a statistical hypotheses, identification and subsequent application of a statistical test, to be encapsulated with the computation and interpretation of a P - value.
- Conduct dual population comparisons through the application of both confidence intervals and hypothesis testing to compare (i) two population means and (ii) two population proportions. Such applications are expected to be done manually and with the assistance of R.
- Model the existing synergy between two quantitative variables through the employment of least- squares estimation , resulting in the creation of a statistical model that predicts one variable based on the value of another
- Conduct a statistical hypothesis on the appropriate of the simple linear model with both the t -test and F- test. Awareness of the conditions of the linear model as well as diagnosis of their satisfaction. Confidence interval estimation of both the mean and an individual value of the response variable.

Electronically Approved - Jan 02 2024 14:43

Department Approval