UNIVERSITY OF CALGARY
FACULTY OF SCIENCE

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

COURSE OUTLINE

1. **Course:** DATA 305, Computational Statistical Modelling - Fall 2019

   Lecture 01: TR 14:00 - 15:15 in MS 571

Instructor	Email	Phone	Office	Hours
James Stallard	jbstall@ucalgary.ca	403 220-3953	MS 582	TBA

   Course Site:

   D2L: DATA 305 L01-(Fall 2019)-Computational Statistical Modelling

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

2. **Requisites:**

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

   Prerequisite(s):
   Data Science 201 or Science 201; one of Data Science 211, Computer Science 217, 231 or 235; and one of Statistics 205, 217, 327, Biology 315, Economics 395, Political Science 399, Psychology 300, Sociology 311, Engineering 319 or Linguistics 560.

   Antirequisite(s):
   Credit for Data Science 305 and any one of Statistics 323, Psychology 301 or Sociology 315 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:

Component(s)	Weighting %	Date
Top Hat ARS	3%	(Additional)
Assignments (8)	20%	Due dates to be announced in class
Quizzes (Best 3 of 4)	20%	Sept.27; Oct. 11; Nov. 22; Dec.6 (in scheduled lab)
Midterm Exam	20%	Friday, October 25th (scheduled lab)
Final Exam	40%	Scheduled by the Registrar

   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 %	50 %

   In each of the above grading components, an assessment will be made producing a percentage grade earned. The final grade in the course is determined to be the weighted-average of the individualistic grade components listed above. The final percentage will then be converted to a final letter grade using the conversion scale listed on this course information sheet.

   This course has a registrar scheduled final exam.

   A minimum mark of 50% on the final exam is required in order to earn a minimum final letter grade of C- in this course. There are no exceptions.

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

   In the event that a student misses the midterm or any course work due to illness, supporting documentation, such as a medical note or a statutory declaration will be required (see Section M.1; for more information regarding the use of statuary declaration/medical notes, see FAQ). Absences must be reported within 48 hrs.

   The regulations of the Faculty of Science pertaining to this matter are found in the Faculty of Science area of the Calendar in Section 3.6. It is the student's responsibility to familiarize themselves with these regulations. See also Section E.3 of the University Calendar.

   Missed quizzes and exams are extremely rare. Any student missing a quiz or exam for reasons beyond the student's control will have a final grade assessed by re weighting the quizzes in which the student has completed. To be consistent and fair to all, this will apply to all students in the course. **There will be no makeup quizzes or exams**. Please consult the FAQ page provided on the Office of the Registrar webpage: (https://www.ucalgary.ca/registrar/registration/appeals/student-faq).

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

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

6. **Course Materials:**

   Recommended Textbook(s):

   Dobrow, Chihara, and Hesterberg, *Computational Statistical Modeling*: Wiley .

   1. RStudio: (rstudio.com/products/RStudio/#Desktop) Ensure you use the 'desktop/free' version in your download.

   2. R-Markdown (rmarkdown.rstudio.com/). You will be required to use R-Markdown to both prepare and submit your assignments.

7. **Examination Policy:**

   You will have access to RStudio for quizzes, the midterm exam, and the final exam. If you wish, you can also use a basic, scientific calculator. Programming or graphical calculators are prohibited from the quiz/midterm/final exam environments.

   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.

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 **10 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 immediately submit the Reappraisal of Graded Term work form to the department in which the course is offered. The department will arrange for a re-assessment of the work if, and only if, the student has sufficient academic grounds. 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 Center:** The Students Union Wellness Centre provides health and wellness support for students including information and counselling on physical health, mental health and nutrition. For more information, see www.ucalgary.ca/wellnesscentre or call 403-210-9355.

c. **Sexual Violence:** The University of Calgary is committed to fostering a safe, productive learning environment. The Sexual Violence Policy (https://www.ucalgary.ca/policies/files/policies/sexual-violence-policy.pdf) is a fundamental element in creating and sustaining a safer campus environment for all community members. We understand that sexual violence can undermine students' academic success and we encourage students who have experienced some form of sexual misconduct to talk to someone about their experience, so they can get the support they need. 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 .

d. **Misconduct:** Academic misconduct (cheating, plagiarism, or any other form) is a very serious offence that will be dealt with rigorously in all cases. A single offence may lead to disciplinary probation or suspension or expulsion. The Faculty of Science follows a zero tolerance policy regarding dishonesty. Please read the sections of the University Calendar under Section K. Student Misconduct to inform yourself of definitions, processes and penalties. Examples of academic misconduct may include: submitting or presenting work as if it were the student's own work when it is not; submitting or presenting work in one course which has also been submitted in another course without the instructor's permission; collaborating in whole or in part without prior agreement of the instructor; borrowing experimental values from others without the instructor's approval; falsification/ fabrication of experimental values in a report. **These are only examples**.

e. **Assembly Points:** In case of emergency during class time, be sure to FAMILIARIZE YOURSELF with the information on assembly points.

f. **Academic Accommodation Policy:** Students needing an accommodation because of a disability or medical condition should contact Student Accessibility Services in accordance with the procedure for accommodations for students with disabilities available at procedure-for-accommodations-for-students-with-disabilities.pdf.

Students needing an accommodation in relation to their coursework or to fulfill requirements for a graduate degree, based on a protected ground other than disability, should communicate this need, preferably in writing, to the Associate Head of the Department of Mathematics & Statistics, Jim Stallard by email jbstall@ucalgary.ca or phone 403-220-3953. Religious accommodation requests relating to class, test or exam scheduling or absences must be submitted no later than **14 days** prior to the date in question. See Section E.4 of the University Calendar.

g. **Safewalk:** Campus Security will escort individuals day or night (See the Campus Safewalk website). Call 403-220-5333 for assistance. Use any campus phone, emergency phone or the yellow phones located at most parking lot pay booths.

h. **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.

i. **Student Union Information:** VP Academic, Phone: 403-220-3911 Email: suvpaca@ucalgary.ca. SU Faculty Rep., Phone: 403-220-3913 Email: sciencerep@su.ucalgary.ca. Student Ombudsman, Email: ombuds@ucalgary.ca.

j. **Internet and Electronic Device Information:** Unless instructed otherwise, cell phones should be turned off during class. All communication with other individuals via laptop, tablet, smart phone or other device is prohibited during class unless specifically permitted by the instructor. Students that violate this policy may be asked to leave the classroom. Repeated violations may result in a charge of misconduct.

k. **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.

l. **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.

Learning Outcomes of DATA 305

- 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.

- Differentiate between when to apply the various probability models covered in the course (Bernoulli, Binomial, Negative Binomial, Geometric, Hypergeometric, Poisson, Normal, Gamma and is special cases (Chi-square and Exponential)). In addition, demonstrate application of such probability models to compute probabilities with R.

- 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.

- Derive the probability distribution of a statistic via computational simulation and compute both its mean, is variance/standard deviation, and its bias.

- Distinction between a parameter and a statistic. Use simulation based methods as a basis for parameter estimation. Employment of pivotal quantities and their distributions as a parallel means for parameter estimation.

- 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 and the computation and interpretation of a P-value.

- Derivation of maximum likelihood estimators through simulation and computation.

- Model the existing synergy between two variables that are either numerical or categorical, through the employment of (i) least-squares estimation, resulting in the creation of a statistical model that predicts one variable based on the value of another or (ii) test of independence. Distinguish between numerical and categorical variables.

- 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.

Department Approval: Electronically Approved Date: 2019-09-04 12:24