DATA 1519 – *Data Modelling II* – Winter 2026

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Lectures: Tuesdays and Thursdays from 10:05 am to 11:25 am. Please check Carleton Central for the room location.

Tutorials: Tuesdays from 11:35 am to 12:25 pm. Please check Carleton Central for the room location. Tutorials will demonstrate how to use R to generate and/or analyze data for some assignment questions.

Office Hours: Tuesdays from 12:30 pm to 1:30 pm in Herzberg Laboratories 4369.

Textbook: Introduction to Probability and Statistics (4th Canadian Edition by Mendenhall, Beaver, Beaver, and Ahmed). Costs to rent or purchase the book can be found here. You are not required to buy the textbook and you may purchase any edition.

Course description: Introduction to modelling real phenomena from planning data collection or gathering observational data to analyzing and providing insights. Topics include experimental design from first principles and simulating the data generating process, linear regression and correlation, one- and two-way Analysis of Variance using open-source statistical software.

Prerequisites: DATA 1517 or (STAT 1500 and STAT 2507) or (STAT 1500 and STAT2655) or (STAT 1500 and STAT 3502); or permission of the Institute of Data Science.

Evaluation: Your final grade will be calculated as:

- Term Mark (60%)
  - Tests (50%)
  - Assignments (10%)
- Final Examination Mark (40%)

Assignments

There will be four assignments, each worth 2.5% of your final grade. Assignments are to be uploaded to the assignment folder on Brightspace before 2:00 PM on the due date. To be accepted for grading, assignments must adhere to the *Assignment Submission Regulations* posted on Brightspace. You are given two weeks to complete each assignment, but the second week is a built-in one-week extension to account for extenuating circumstances you may encounter. No additional extensions will be given.

Assignment	Available	Due BEFORE 2:00PM
Assignment 1	Friday, Jan 16th	Friday, Jan 30st
Assignment 2	Friday, Jan 30th	Friday, Feb 13th
Assignment 3	Friday, Feb 27th	Friday, Mar 13th
Assignment 4	Friday, Mar 20st	Friday, April 3rd

Tests
There will be two tests on **Thursday, February 26th, 10:05am to 11:25am** and **Thursday, March 19st, 10:35am to 11:25am**. The higher of the two tests will be worth 30% and the lower of the two tests will be worth 20%.

Final Exam: The final exam will cover all of the material given during the term and it will be scheduled by the university. The exam period runs from **April 11 – 23**. It is the responsibility of each student to be available during the exam period. In particular, no travel plans should be made until the examination schedule is released.

Note: The two tests and final exam will be written in-person at Carleton University. No online/distance proctoring of tests or the final exam will be permitted under any circumstances.

Allowed Material:
The following applies to assignments, tests, and final exam.

- ***Calculators:*** Only non-programmable, non-graphing calculators are allowed.
- ***Statistical Tables:*** You are only permitted to use the statistical tables provided by the instructor. You can not use any other tables.
- ***Statistical Software/Applications:*** You will be learning R in the tutorials. The use of any other applications including Excel is not permitted.
- ***Generative AI:*** Use of Generative AI of any form is **not** permitted.

Academic Integrity: Misconduct in scholarly activity will not be tolerated and will result in consequences as outlined in Academic Carleton University's Academic Integrity Policy. A list of standard sanctions in the Faculty of Science can be found here.

Student Rights & Responsibilities: Students are expected to act responsibly and engage respectfully with other students and members of the Carleton and the broader community. See the 7 Rights and Responsibilities Policy for details regarding the expectations of non-academic behaviour of students. Those who participate with another student in the commission of an infraction of this Policy will also be held liable for their actions.

Requests for Academic Accommodation: You may need special arrangements to meet your academic obligations during the term. For accommodation requests, consult this link. If you are a PMC student requesting oner of the accommodations listed under this link, then please inform me of your PMC status when making the request.

Important Dates: Important dates and deadlines, including statutory holidays, can be found here.

ADDITIONAL COURSE POLICIES:

1. Students are permitted to miss a **maximum of one test** due to extenuating circumstances as defined by the Academic Consideration Policy. These students must complete the Academic Consideration for Coursework Request Form within three business days of the original test. Students who correctly follow this procedure will have the missing test grade replaced by their grade on the final exam. Failure to follow this procedure will result in a grade of 0% on the missed test. Students who miss a second test will be required to meet with the instructor to determine whether they will be permitted to remain in the course. To defer a final exam, students must apply through the Registrar's Office.

2. Missed Assignments: The lowest assignment score will automatically be replaced by your grade on the final exam, provided that the final exam grade is the greater of the two scores. This includes replacing a missed assignment. This policy will not replace a grade of 0 that is a result of violating Carleton University's Academic Integrity Policy.

3. Concerns about grading on assignments or tests must be brought to my attention within three business days of these items being available for review.

4. Any student wishing to review their final exam must make an appointment within a two-week period following the submission of the final grades. These appointments are solely for educational purposes and are **not** to be treated as an opportunity to debate your grade.

5. You must use your Carleton email account for all email communications. I am unable to respond to non-Carleton emails due to the Freedom of Information and Protection of Privacy Act.

6. "No student shall engage in disruptive conduct affecting any activity or service of the University, including its teaching, learning, etc." – *Student Affairs, Carleton University*. Examples of disruptive behaviour include, but are not limited to, students socializing during class and students using electronic devices for reasons unrelated to the lecture. Students engaging in disruptive behaviour may be asked to leave the classroom for the remainder of the lecture. Repeated instances of disruptive behaviour will be reported to the Office of the Dean of Science.

TENTATIVE LECTURE SCHEDULE

WEEK	DATES	SECTIONS	TOPICS
1	Jan 6, 8	4.8, 5.1 – 5.3	Probability distributions, expected values, and variances for discrete random variables. Binomial distribution. Poisson distribution.
2	Jan 13, 14	6.1 – 6.4	Probability distributions for continuous random variables. Normal distribution. Normal approximation to the binomial distribution.
3	Jan 20, 22	7.1 – 7.6	Sampling plans. Sampling distributions of statistics. Central Limit Theorem. Sampling distribution of the sample mean. Sampling distribution of the sample proportion.
4	Jan 27, 29	8.1 – 8.6, 10.1 – 10.4	Point estimation. Interval estimation. Confidence intervals for one population mean, one population proportion, difference between two population means, ad difference between two population proportions.
5	Feb 3, 5	9.1 – 9.3, 9.5, 10.3	Hypothesis testing for one population mean, one population proportion, two population means, and two population proportions.
6	Feb 10, 12	8.8, 9.1 – 9.7, 9.5, 10.3,10.4	Confidence interval for the difference between two population (binomial) proportions. Testing hypotheses about population parameters. Statistical tests of hypothesis. Sigma-known test about a population mean. Sigma-unknown test about a population mean. Test about a population (binomial) proportion.
N/A	Feb 16 – 20	**FALL BREAK**	
7	Feb 24, 26	Introduction, 11.1 – 11.3	Experimental Design, Completely Randomized Design (CRD), One-Way Analysis of Variance (ANOVA)
8	Mar 3, 5	11.5 – 11.8	Randomized Block Design (RBD), ANOVA for RBD and Tukey Simultaneous Pairwise Comparisons. $a \times b$ Factorial Experiment, Two-Way ANOVA and Tukey Simultaneous Pairwise Comparisons.
9	Mar 10, 12	12.1 – 12.4	Simple Linear Regression Model, Least-Squares Estimation, Inferences Concerning the Slope.
10	Mar 17, 19	13.1 – 13.3	Multiple Regression Model, Multiple Regression Analysis
11	Mar 24, 26	13.3 – 13.6	Multiple Regression Analysis (cont'd), Polynomial Regression Models, Interaction Between Predictors, Qualitative Predictors
12	Mar 31, Apr 2	13.8, 13.9	Partial F Test
13	Apr 7	NA	Model Building and Selection, Multicollinearity

This outline is subject to change depending on the progress of the course. All necessary changes will be announced in class and on Brightspace. It is the responsibility of the student to keep up to date with any such modifications.