

University of Manitoba
Department of Statistics

STAT 3150—Statistical Computing

Fall Term 2025

Course Details

Course Number & Title: STAT 3150—Statistical Computing
Section & CRN: Section A01, CRN: 19998
Course Schedule: M/W/F, 08:30 A.M - 09:20 A.M,
Prerequisites: STAT 2150 (Statistics and Computing) and
STAT 2400 (Introduction to Probability 1)
Course Website: UM Learn

Instructor Contact Information

Instructor: Sumeet Kalia
Office Location: 256 Parker Building
Email: Sumeet.Kalia@umanitoba.ca
Office Hours: 107 Allen Building
Monday & Wednesday, from 10:00 AM - 11:00 AM
by appointment (for individual meetings)
Changes/additions to be announced on UMLearn.
Teaching Assistant: Madhawa Hulangamuwa
Wednesday, from 2:30 PM to 3:30 PM
hulangam@myumanitoba.ca

Student Learning Objectives

This course aims to provide students with a broad overview of computational techniques used in modern statistical analysis. Throughout the course, students will:

- Become proficient in R, to the level that they can analyze data using the tools from this class.
- Learn how to sample from various distributions, directly and indirectly.
- Design and conduct a simulation to study a particular statistical question.
- Become familiar with several resampling techniques and know which one to use for a particular problem.
- Be introduced to numerical methods and optimisation techniques.

Textbook and Other Materials

Textbook: The following textbook is not required, but *strongly recommended*:
Statistical Computing with R (2nd ed.) by Maria L. Rizzo, CRC Press, 2019.

Course Material: Lecture slides, code, and any additional material will be made available on UM Learn.

Course Assessment

Assignments: There will be six (6) assignments during the term, worth a total of 50% of the final grade. Only five of the six assignments will count towards the final grade:

- Once during the semester, a student can choose to **not** submit an assignment. The remaining five assignments will then all be worth 10% of the final mark.
- If a student submits all six assignments, then only the five assignments with the highest mark will count equally towards the final grade.

Students are encouraged to form study groups to discuss assignment questions but not the answers. Each student must submit his or her own individual written work. Copying, in whole or in part, the work of another will not be tolerated and will result in disciplinary action. The use of generative AI tools (e.g., ChatGPT) is strictly prohibited and will result in disciplinary action. Assignments should be handed in electronically via UM Learn on the due date. **Late submissions will not be accepted.**

Assignment	Due Date
1	Friday, September 26 at 11:59 PM
2	Friday, October 10 at 11:59 PM
3	Friday, October 24 at 11:59 PM
4	Friday, November 7 at 11:59 PM
5	Friday, November 21 at 11:59 PM
6	Friday, December 5 at 11:59 PM

Midterm: There will be one (1) midterm test. The mid-term will be scheduled out of class on **Monday November 3rd at 6:00 PM – 8:00 PM**. Location details will be made available close to the examination. The midterm will be worth 20% of the final mark. Test content is defined by the lecture notes along with the relevant chapters from the textbook. There will be no make-up tests for mid-term. If you miss the mid-term with a valid reason and inform me within 48 hours of the scheduled mid-term examination, then the weight of the midterm will be transferred to the final exam.

Final Exam: There will be one (1) final exam in this course. It will be worth 30% of the final grade.

Grading Timeline: Work will be graded and returned within two weeks of submission.

Course Evaluation and Grading Scheme

Final Mark: The final mark for the course will be obtained according to the following rule:

Assignments (6)	50%
Midterm Test (1)	20%
Final Exam (1)	30%

Letter Grade: I normally follow the following cutoffs when assigning letter grades:

Letter Grade	Mark out of 100
A+	[90 – 100]
A	[80 – 90)
B+	[75 – 80)
B	[70 – 75)
C+	[65 – 70)
C	[60 – 65)
D	[50 – 60)
F	below 50

However, I might elect to use lower thresholds for some letter grades if I think they are more appropriate (i.e. use a smaller lower bound for the ranges above). I will not use higher thresholds.

Outline of Covered Topics

The course is expected to cover the following topics, as time permits:

1. Numerical Methods (Chapter 13)
2. Introduction to Optimisation (Chapter 14)
3. Generating Random Variables (Chapter 3)
4. Monte Carlo Integration (Chapter 6)
5. Importance Sampling (Chapter 6)
6. Monte Carlo Methods for Inference (Chapter 7)
7. Bootstrap and Jackknife (Chapter 8)
8. Resampling Applications (Chapter 9)
9. Permutation Tests (Chapter 10)

Important Dates

The following dates are important to how the course will progress throughout the term.

Date	Information
Sep 3	First lecture
Sep 30	Orange Shirt Day (No Lecture)
Oct 13	Thanksgiving Day (No Lecture)
Nov 3	Midterm (6pm-8pm)
Nov 11	Remembrance Day (No Lecture)
Nov 10-14	Fall Term break (No Lectures)
Nov 18	Voluntary Withdrawal deadline
Dec 8	Last day of classes
Dec 9-19	Final Examination Period

The date for the midterm test are tentative (and subject to change at my discretion and/or based on the learning needs of the students). Changes are subject to Section 2.8 of the ROASS Procedure.

Student Illness

Refer to the *Short-Term Academic Accomodations* section in the Appendix. No medical notes are required for absences up to 72 hours, but you are required to submit a self-declaration for brief and temporary student absences form to me. For absences over 72 hours, a medical note may be requested. If you are unable to complete any coursework due to your absence, we will discuss how the work can be made up.

Instructor Illness

In the situation that I become ill, I will work with the Statistics department to find a substitute to continue teaching in-person. In the event that a suitable instructor cannot be found, I may provide an online lecture and upload the recording to UM Learn. I will make sure to send an email to your UM email, as well as post an announcement on UM Learn.

Class Communications

The University requires all students to activate an official U of M email account, which should be used for all communications between yourself and the university (including all your instructors). All these email communications should comply with the University's policy on electronic communication with students, which can be found at: http://umanitoba.ca/admin/governance/governing_documents/community/electronic_communication_with_students_policy.html

Copyrights

Copyrighted Materials: We will use copyrighted content in this course. I have ensured that the content I use is appropriately acknowledged and is copied in accordance with copyright laws and University guidelines. Copyrighted works, including those created by me, are made available for private study and research and must not be distributed in any format without permission. Course materials (both paper and digital) are for the participants' private study and research only.

Lectures: No audio or video recording of lectures or presentations is allowed in any format, openly or surreptitiously, in whole or in part without my permission.

More details are available online at <http://umanitoba.ca/copyright/>.

Student Accessibility Services

If you are a student with a disability, please contact Student Accessibility Services (SAS) for academic accommodation supports and services such as note-taking, interpreting, assistive technology and exam accommodations. Students who have, or think they may have, a disability (e.g. mental illness, learning, medical, hearing, injury-related, visual) are invited to contact SAS to arrange a confidential consultation.

ROASS Schedule A

Schedule “A” of the *Responsibilities of Academic Staff with regards to Students* (ROASS) policies of the University of Manitoba lists resources and policies for students. It is important that you familiarize yourself with these resources and policies. This document is available at: <https://umanitoba.ca/governance/governing-documents-students>.

Students enrolled in this course must ensure they satisfy the following minimum technological requirements:

1. A computing device where one can create and edit documents,
2. An internet connection capable of streaming videos and downloading software, and
3. Access to a web-cam and microphone.

University of Manitoba Acknowledgement of Traditional Territories

The University of Manitoba campuses are located on original lands of Anishinaabeg, Cree, Oji-Cree, Dakota, and Dene peoples, and on the homeland of the Métis Nation.

We respect the Treaties that were made on these territories, we acknowledge the harms and mistakes of the past, and we dedicate ourselves to move forward in partnership with Indigenous communities in a spirit of reconciliation and collaboration.