Department of Mathematics & Statistics
Concordia University

STAT 449 (MAST 671/MAST 881), Sec. B

Advanced Probability

Fall 2025

Instructor: Dr. W. Sun
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Office Hours: TBA.

Class Schedule: Tuesdays and Thursdays, 14:45-16:00.
Note: There will be a mid-term break from October 11 to October 17.

Textbook: *Probability and Random Processes*, by G. Grimmett and D. Stirzaker.
The hard-copy text can be purchased at the Concordia bookstore, https://www.bkstr.com/concordiastore/home
Note: Students should order textbooks as early as possible, especially for printed versions in case books are backordered or there are any shipping delays.

Assignments: There will be about 5 assignments.

If the grading scheme for this course includes graded assignments, a reasonable and representative subset of each assignment may be graded. Students will not be told in advance which subset of the assigned problems will be marked and should therefore attempt all assigned problems.

Midterm Exam: There will be one midterm exam. The schedule of the exam will be announced later. **NO MAKE-UP EXAMS**.

Note: It is the Department's policy that tests missed for any reason, ***including illness***, cannot be made up. If you miss the midterm ***because of illness (with valid medical note required)***, the final exam will count for 90% of your final grade, and assignments for the remaining 10%.

Final Exam: There will be a three-hour final exam, whose date is set by the Examination's Office sometime in the middle of the term.

PLEASE NOTE: Students are responsible for finding out the date and time of the final exam once the schedule is posted by the Examination Office. Any conflicts or problems with the scheduling of the final exam must be reported

directly to the Examination Office, **not** to your instructor. It is the Department's policy and the Examination Office's policy **that students are to be available until the end of the final exam period. Conflicts due to travel plans will not be accommodated.**

Final Grade: **Undergraduate students:**

The final grade will be based on the higher of (a) or (b):
(a) Assignments (10%), Midterm (30%), Final Exam (60%)
(b) Assignments (10%), Final Exam (90%)

Graduate students:

a) Homework (10%)
b) Midterm Exam (20%)
c) Final Exam (50%)
d) Presentation (20%)

Topics: This course will cover the materials from Chapters 1, 2, 3, 4, 5, 7 and 12 including:

- Probability space, discrete and continuous random variables.
- Conditional probability and conditional expectation.
- Generating functions, characteristic functions, limit theorems.
- Random walk and branching processes.
- Convergence of random variables, modes of convergence.
- Introduction of martingales, martingale convergence theorem, optional stopping.

Week	Topics to be covered
1	Chapters 1 and 2, Section: 3.1 - 3.3
2	Section: 3.4 - 3.7
3	Section: 4.1 - 4.8
4	Section: 5.1 - 5.3
5	Section: 5.4 - 5.6
6	Section: 5.7 - 5.10
7	Section: 5.11, Midterm exam
8	Section: 7.1 - 7.3
9	Section: 7.4, 7.10
10	Section: 7.7, 7.8
11	Section: 12.1, 12.3 - 12.5
12	Presentations by graduate students

Student Services

You may wish to access the many services available to you as a Concordia student. An overview of these resources can be found here: https://www.concordia.ca/students/services.html

Academic Integrity and the Academic Code of Conduct
This course is governed by Concordia University's policies on Academic Integrity and the Academic Code of Conduct as set forth in the Undergraduate Calendar and the Graduate Calendar. Students are expected to familiarize themselves with these policies and conduct themselves accordingly. "Concordia University has several resources available to students to better understand and uphold academic integrity. Concordia's website on academic integrity can be found at the following address, which also includes links to each Faculty and the School of Graduate Studies: https://www.concordia.ca/conduct/academic-integrity.html" *[Undergraduate Calendar, Sec 17.10.2]*

Behaviour
All individuals participating in courses are expected to be professional and constructive throughout the course, including in their communications.

Concordia students are subject to the Code of Rights and Responsibilities which applies both when students are physically and virtually engaged in any University activity, including classes, seminars, meetings, etc. Students engaged in University activities must respect this Code when engaging with any members of the Concordia community, including faculty, staff, and students, whether such interactions are verbal or in writing, face to face or online/virtual. Failing to comply with the Code may result in charges and sanctions, as outlined in the Code.

Intellectual Property
Content belonging to instructors shared in online courses, including, but not limited to, online lectures, course notes, and video recordings of classes remain the intellectual property of the faculty member. It may not be distributed, published or broadcast, in whole or in part, without the express permission of the faculty member. Students are also forbidden to use their own means of recording any elements of an online class or lecture without express permission of the instructor. Any unauthorized sharing of course content may constitute a breach of the Academic Code of Conduct and/or the Code of Rights and Responsibilities. As specified in the Policy on Intellectual Property, the University does not claim any ownership of or interest in any student IP. All university members retain copyright over their work.

Extraordinary circumstances
In the event of extraordinary circumstances and pursuant to the Academic Regulations the University may modify the delivery, content, structure, forum, location and/or evaluation scheme. In the event of such extraordinary circumstances, students will be informed of the change.