



STAT 450 (MAST 672/MAST881), Sec. C (Fall 2026)
Mathematical Statistics

Instructor:	Dr. A. Sen
Email Address:	arusharka.sen@concordia.ca
Office Hours:	Thursdays, 14 :00– 15:30.
Important:	Students should get the above information from their instructor and from the course Moodle site. The instructor is the person to contact should there be any questions about the course.
Class Schedule:	Wednesdays & Fridays, 10:15-11:30.
Prerequisites:	STAT 250 , STAT 349 .

Reading Week

Begins on Saturday, October 10 and ends on Friday, October 16, 2026. No classes that week.

Description

Derivation of standard sampling distributions; distribution of order-statistics; estimation, properties of estimators; Rao-Cramer inequality, Rao-Blackwell theorem, maximum likelihood and method of moments estimation, Neyman-Pearson theory, likelihood ratio tests and their properties.

Text

Introduction to Mathematical Statistics, 8th Edition, by R.V. Hogg, J.W. McKean and A.T. Craig, Pearson, 2019. (However, 6th or 7th Editions are also ok.).

The digital version of the textbook will be available at:

<https://www.bkstr.com/concordiastore/home>

Note: Students should order textbooks as early as possible, especially for print versions in case books are backordered or there are any shipping delays.

Reference

(for problems, examples, etc.) *Statistical Inference* (2nd Edition), by G. Casella and R. L. Berger, Duxbury.

Final Grade

The final score will be the maximum of (a), (b), (c):

- a) Assignments (4) 10% + midterm exam (**FRI., 23 OCT. 2026, in class**) 20% + final exam 70%
- b) Assignments (4) 10% + final exam 90%
- c) Final exam 100%

Assignments will be online and posted on Moodle; once posted, assignments will be due in 2 weeks (tentative), to be uploaded on Moodle. **Midterm** and **Final exams** will be in person (Final according to the schedule posted by the University). **No make-up assignments or midterm.**

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.

Note: - All assignments should be done **independently**.

- MAST 672/881 students will be given additional assignment/exam problems.

Topics

1. Distribution of functions of several random variables (distribution function and change of variable techniques), sampling distribution of mean and variance of a sample from Normal (μ , σ^2) distribution: *Sec. 2.2, 2.7*.
2. Distribution of order statistics and sample quantiles: [**6th Edition:** *Sec. 5.2.1- 2*, **7th Edition:** *Sec. 4.4.1-2*].
3. Estimation: unbiasedness, Cramér-Rao lower bound and efficiency, method of moments and maximum likelihood estimation, consistency, limiting distributions [**6th Edition:** *Sec. 4.1, 6.1, 4.2, 4.3 – 4, 6.4*, **7th Edition:** *Sec. 4.1, 6.1, 5.1 – 5.3, 6.2, 6.6*].
4. Sufficiency, minimal sufficiency, completeness, UMVUE, Rao-Blackwell and Lehman-Scheffe theorems: *Sec. 7.2 - 7.8*.
5. Hypothesis testing [**6th Edition:** *Sec. 5.5, 6.3 6.5*, **7th Edition:** *Sec. 4.5, 6.3, 6.5*].

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>

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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.

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As a student, you are expected to follow the email policy and to use your Concordia email in a respectful and responsible manner. The policy helps ensure that communication across the university is secure, reliable, and consistent.

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.