

STAT 465 (MAST 679/MAST 881), Sec. K
Multivariate Statistics
Fall 2024

- Instructor:** Dr. D. Sen, Office: LB 921.3 (SGW), Phone: (514) 848-2424, Ext. 3241
Email: debaraj.sen@concordia.ca
- Class Schedule:** Wednesdays & Fridays, 13:15-14:30.
Mid-term break: no class between October 15, 2024, and October 20, 2024.
- Office Hours:** Fridays, 11:00-12:30.
- Textbook:** *Applied Multivariate Statistical Analysis*, 6th Edition, by R. A. Johnson and D. W. Wichern, Pearson Prentice Hall (2007).
Note: Students should order textbooks as early as possible, especially for print versions in case books are back ordered or there are any shipping delays.
- Other Reference:** *Linear Statistical Inference and Its Applications*, 2nd Edition, by C. R. Rao, Wiley(1973).
- Calculators:** Only calculators approved by the Department (with a sticker attached as proof of approval), are permitted for the class test and final examination.
For the list of Approved calculators see
<https://www.concordia.ca/artsci/math-stats/services.html#calculators>.
- Assignments:** There will be 5 assignments. Assignments are compulsory. **Late assignments will not be accepted.** Assignments contribute 15% to your final grade. Working regularly on the assignments is essential for success in this course.
- Midterm Test:** There will be one midterm test, based on the material of Weeks 1-6, which will contribute up to 25% to your final grade (see the Grading Scheme below). Missed tests cannot be made up. The midterm test will be held on **Wednesday, October 23, 2024**. This exam and the final will be closed book exams.

NOTE: It is the Department's policy that tests missed for any reason, **including illness**, cannot be made up. Students who are unable to write the midterm test for a valid reason must write to their instructor to request a 85% final exam. Such a request will not be granted unless it is made in writing (by email), the reason is valid and is supported by documentation or other evidence. Valid reasons for missing a midterm test include: conflicts with other exams or religious

observances (must be reported to the instructor in advance); illness (Short-Term Absence form or valid medical note required); and bereavement. Students who miss the midterm test but do not request a 85% final, as described above, will forfeit the marks for the midterm test.

Final Exam: The final examination will be three hours long and will cover all the material in the course. To obtain a good grade, the student **MUST** show that she/he has a THOROUGH understanding of the subject and is good at problem-solving.

NOTE: Students are responsible for finding out the date and time of the final exams once the schedule is posted by the Examinations Office. Conflicts or problems with the scheduling of the final exam must be reported directly to **the Examinations Office, not to your instructor**. It is the Department's policy and the Examination Office's policy that students must be available to take the final exam on the selected date and time. Conflicts due to travel plans will not be accommodated.

Final Grade:

- a) Assignments (15%)
- b) Midterm test (25%)
- c) Final examination (60%)

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.

IMPORTANT: **PLEASE NOTE THAT THERE IS NO "100% FINAL EXAM" OPTION IN THIS COURSE.**

| Week | Topics to be Covered | Sections |
|------|--|-----------------------------|
| 1 | Matrix Algebra & Random Vectors | 2.2-2.7 |
| 2 | Vectors & Matrices, Sample Geometry & Random Sampling | 2A, 3.3-3.6 |
| 3 | The Multivariate Normal Distribution | 4.1-4.5 |
| 4 | The Multivariate Normal Distribution | 4.6-4.8 |
| 5 | Inferences about a Mean Vector | 5.1-5.4 |
| 6 | Inferences about a Mean Vector | 5.5-5.8 |
| 7 | Comparisons of Several Multivariate Means | 6.1-6.3 MIDTERM TEST |
| 8 | Comparisons of Several Multivariate Means | 6.4-6.6 |
| 9 | Principal Components | 8.2-8.4 |
| 10 | Factor Analysis and Inference for structured covariance matrices | 9.1-9.4 |
| 11 | Canonical Correlation Analysis | 10.2-10.6 |
| 12 | Discrimination and Classification & Review | 11.1-11.6 |

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.