

STAT 465 (MAST 679/881), Sec. K
Multivariate Statistics
Fall 2022

This course will be in-person, but assignments and exams will be online via Moodle.

- Instructor:** Dr. A. Sen, Office: LB 921-23 (SGW), Phone: (514) 848-2424, Ext. 3230
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- Delivery Method:** Lectures will be in-person at MB-3.255 (SGW). Every attempt will be made to record them via lecture-capture or Zoom and upload them to the Moodle site for this course. However, when recording is not possible students will have to take notes from chalkboard. All available lecture notes will be posted on Moodle.
- Prerequisite:** MATH 252; STAT 360 or equivalent.
- Description:** Multivariate normal distribution; estimation and testing of hypothesis about mean vector; multiple and partial correlation; MANOVA; principal components analysis.
- Office Hours:** Thursdays 16:00–17:30, subject to change; questions by email anytime; **please send email from your email account, not from Moodle!**
- 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 backordered 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 a list of Approved calculators see <http://www.concordia.ca/artsci/math-stats/services.html#calculators>.
- Assignments, midterm and final:** Assignments (about 4), midterm and the final exams will be given **online** via Moodle, so that it will be possible for students to use a software such as **R** to solve data analysis questions. Once posted on Moodle, **assignments** will have to be returned in **2 weeks** approximately, **midterm exam** in **1 hour 30 minutes** approx. and the **final exam** in **3 hours 15 minutes** approx.

NOTE: Students are responsible for finding out the date and time of the final exam 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 (30%): **(FRI., 21 OCT. 2022)**
 - c) Final examination (55%)

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	6.1-6.2 MID TERM TEST
8	Comparisons of Several Multivariate Means	6.3-6.6
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	11.1-11.5
13	Discrimination and Classification & Review	11.6-11.8

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.

Use of Zoom

Note: Zoom is included as an institutionally-approved technology. This means we have been assured of the privacy protections needed to use freely within the classroom.

Zoom might be used in this course to facilitate learning at a distance. It may be used to record some or all of the lectures and/or other activities in this course. If you wish to ensure that your image is not recorded, speak to your instructor as soon as possible.

Also, please note that you may not share recordings of your classes and that the instructor will only share class recordings for the purpose of course delivery and development. Any other sharing may be in violation of the law and applicable University policies, and may be subject to penalties.

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.