

STAT 4690/ 7200 – Applied Multivariate Analysis
FALL 2014

CRN 24809/ 24813

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Office hours M W 1:00 PM – 2:00 PM, or by appointment.

Lectures M W F 10:30 AM – 11:20 AM
Machray Hall, room 316

Website <https://umanitoba.ca/d21>

Textbook *Applied Multivariate Statistical Analysis*, 6th edition
R. A. Johnson and D. W. Wichern, Prentice Hall, 2007.

The textbook is not required but strongly recommended. A hard-copy will be available on course reserve.

Prerequisites Students should have a good working knowledge of statistical inference and linear models: STAT 3480 (005.348) (C); and a C or better in one of MATH 2300 (136.230), MATH 2301, MATH 2352, or the former MATH 2350 (136.235); or consent of instructor. Prior programming experience in R is useful but not required.

Evaluation The final grade will be based on the following components.

Assignments	15%
Data Project	15%
Midterm	25%
Final Exam	45%

Midterm and Final Exams Exam content is defined by the lecture notes along with the relevant chapters from the textbook. The Midterm Exam is tentatively scheduled to be held outside of class time during the week of October 27, 2014. The Final Exam date will be set by the Department of Statistics and announced later in the semester. **There will no make-up exams.**

Assignments There will be two assignments (worth 6% and 9%) during the term. 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 (see Academic Integrity section). Assignments should be handed in at the beginning of class on the due date. **No late submission will be accepted.**

Data Project The data project will be a team project, where students will analyze real data using the techniques covered in the course. Teams will find their multivariate dataset for the project and detail their multivariate analysis in a project report (contributing 10% to final grade) to be submitted in the third last week of the term. Part of the last two weeks' classes will be devoted to group presentations (contributing 5% to final grade), each lasting 10-15 minutes. Further details about the project will be provided in class.

Requirements for STAT 7200 Students enrolled in STAT 7200 will be required to do additional work in the form of extra assignment and exam questions appropriate at the graduate level.

Tentative Topics

1. Aspects of multivariate analysis: handling multivariate data, graphical displays, statistical distance (Chapter 1)
2. Matrix algebra and random vectors: eigenvalues and eigenvectors, positive definite matrices, mean vectors and covariance matrices (Chapter 2)
3. Random Samples: sample geometry, characterizing random samples (Chapter 3)
4. Multivariate normal distribution: definition and properties, estimation and sampling distributions (Chapter 4)
5. Inferences about a mean vector: Hotelling's T^2 and likelihood ratio tests, confidence regions and multiple comparisons (Chapter 5)
6. Multivariate linear regression: least squares estimation and inference (Chapter 7)
7. Principal Component Analysis: definition, interpretation and use of principal components (Chapter 8)
8. Factor Analysis: orthogonal factor model, estimation and inference (Chapter 9)
9. Discrimination and Classification (Chapter 11) – *if time permits*

Academic Integrity

It is your responsibility to understand the meaning and consequences of academic dishonesty. Therefore, please check:

<http://www.umanitoba.ca/science/undergrad/resources/webdisciplinedocuments.html>.