

CONCORDIA UNIVERSITY

JOHN MOLSON SCHOOL OF BUSINESS DEPARTMENT OF DECISION SCIENCES AND M.I.S.

MSCA 683: MULTIVARIATE DATA ANALYSIS Section AA - Winter 2009

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CLASS MEETINGS : Wednesday 17:45 - 20:15 GM725
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1. COURSE DESCRIPTION

The course attempts to address issues arising from handling multi-dimensional measurements in both business research and applications. Since a wide range of statistical methods are available for tackling different types of multivariate problems, a careful selection of such tools is made to cover those that are most commonly used in practice. These include methods of dimensionality reduction to better visualize and understand complex data, structured approaches in studying inter-relationships between the measured variables, analysis of dependency and different classification techniques for the analyses of business problems. The course emphasizes the understanding of the intuition and rationale behind each method introduced, as opposed to a more mathematical approach usually taken in a classical multivariate analysis course. Consequently, discussion of probabilistic distributional theory will be kept to a minimum. The mathematical aspect of a method will be discussed only if it helps the understanding of the purpose and application of the method. Examples from various disciplines will be employed to illustrate different techniques. While statistical computation is an integral part of implementing the introduced techniques, focus is on statistical ideas rather than details of calculation, though the course makes extensive use of computer output.

2. COURSE OBJECTIVES

The course aims at equipping students with a set of popular techniques for analyzing multivariate data. It intends to help students develop the skill of identifying research situation and application context where a data analysis in the multivariate setting is highly relevant. At the end of the course the students are expected to be able to formulate their research ideas using appropriate multivariate models and to make sensible interpretation from analyzing such models. The purpose is not only to train students to acquire the skills of investigating their research hypotheses using multivariate data analysis, but more importantly, to help them understand the assumptions, purposes and limitations of the methods employed so that they will be aware of the

need for more specialized methods beyond those covered in the course in order to address their research problems properly.

3. INSTRUCTIONAL METHODS

- Lectures
- Assignments
- Term Project (individual or team work)

4. TEXT

Principal text *

Lattin, J., Carroll, J., and Green P (2003). *Analyzing Multivariate Data*. Duxbury Press, ISBN 0-534-34974-9.

** Note: Acquisition of the principal texts, or of some other book at a similar level, is advised. However, the lectures may not directly follow the text book and may contain additional materials. The chapters and sections listed below correspond to the principal text.*

5. TOPICS

Topic	Chapter
1. Principal component Analysis	4
2. Exploratory factor analysis	5
3. Confirmatory factor analysis	6
4. Structural equation models	10
5. Canonical correlation	9
6. MANOVA	11
7. Discriminant analysis	12
8. Logit choice models	13
9. Multidimensional scaling	7
10. Cluster analysis	8

6. EVALUATION

Evaluation will be based on assignments, a midterm test, a final examination and a term project.

- The midterm test will be held on February 18, 2009.
- Students, preferably in small groups, will be required to carry out a project. A class presentation and a complete report are required for the project.
- The final examination will be based on **all** the material covered in the course.

Final grade will be made up as follows

Assignments	15%
Test	25%
Project	20%
Final Exam	<u>40%</u>
	100%