DALHOUSIE UNIVERSITY

Faculty of Science Course Syllabus (revised June 2018)
Department of *Mathematics and Statistics*
Applied Multivariate Analysis, 4350/5350
Applied Multivariate Analysis
Fall, 2018

Instructor(s): *Keith Thompson* *keith.thompson@dal.ca* *Room 5635, Oceanography, LSC*

Lectures: *10:05-11:25am Tuesday and Thursday,* *LSC Common Area C210*

Laboratories: *0*

Tutorials: *Two tutorials to review (i) matrix theory and (ii) programming an Matlab and R, as required.*
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Course Description
The course deals with the stochastic behaviour of several variables in systems where their interdependence is the object of analysis. Greater emphasis is placed on practical application than on mathematical refinement. Topics include classification, principal analysis, categorized data, analysis of interdependence, structural simplification by transformation or modelling and hypothesis construction and testing.

Course Prerequisites
Either (a) STAT3340 (Regression and Analysis of Variance), MATH2135 (Linear Algebra) or MATH2040

(Matrix Theory and Linear Algebra II)

Or (b) permission of the Instructor

Course Objectives/Learning Outcomes
The course has two main learning objectives:

I: Given a multivariate data set, the student will be able to (i) visualize it, (ii) perform an exploratory data analysis to identify potentially important inter-relationships, and (iii) fit, and rigorously evaluate, models.

II: Given a problem requiring the analysis of multivariate data, the student will be able to (i) identify the most relevant statistical methods to apply, (ii) be aware of their limitations, and (iii) understand the basic statistical theory underpinning the selected methods.

Course Materials
(i) Course textbook is "Applied Multivariate Statistical Analysis" by R. Johnson and D. Wichern, (published by Prentice Hall, Edition 6).

(ii) Course notes by instructor to supplement course textbook.

(iii) Course notes, assignments, selected old exams and codes will be made available on the course combined 4350/5350 website.

Course Assessment

Based on a combination of approximately six assignments, a mid term and a final exam. The timing of the assignments will be adjusted to take into account missed days due to bad weather. The midterm will be during regular class time. The final exam will take place during the regular exam period; the exact date to be chosen by the instructor in consultation with students in order to best fit their schedules.

Component	Weight (% of final grade)	Date
Midterm Exam	*30*	*Tuesday 18 October, 2018.*
Final exam	*40*	*TBD (see above)*
Assignments	*30*	*TBD (see above)*

Other course requirements
None

Conversion of numerical grades to Final Letter Grades follows the <u>**Dalhousie Common Grade Scale**</u>

A+ (90-100)	B+ (77-79)	C+ (65-69)	D	(50-54)
A (85-89)	B (73-76)	C (60-64)	F	(<50)
A- (80-84)	B- (70-72)	C- (55-59)		

Course Policies
(i) Late assignments will not be accepted unless pre-approved by instructor.
(ii) Missed assignments or exams will result in zero marks unless reason is given in writing to instructor. Given a sufficiently strong case, an accommodation will be made.
(iii) Weather-related cancelled classes. Missed material will still be covered in class but the due dates of assignments may be adjusted.

Course Content
Material presented in class will be drawn from the following chapters of Johnson and Wichern:
Ch 1: Aspects of Multivariate Analysis
Ch 2: Matrix Algebra and Random Vectors
Ch 3: Sample Geometry and Random Sampling
Ch 4: The Multivariate Normal Distribution
Ch 5: Inferences about a Mean Vector
Ch 7: Multivariate Linear Regression
Ch 8: Principal Component Analysis
Ch 11: Discrimination and Classification
Ch 12: Cluster Analysis (time permitting)