

Faculty of Science Course Syllabus
Department of Mathematics and Statistics
Applied Multivariate Analysis 4350/5350
Applied Multivariate Analysis
Fall, 2016

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

Lectures: 10:05-11:25am Location LSC Common Area C202

Laboratories: 0

Tutorials: Two tutorials to review (i) matrix theory and (ii) programming in Matlab and R

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, cluster analysis, categorized data, analysis of interdependence, structural simplification by transformation or modelling and hypothesis construction and testing.

Course Prerequisites

- (i) STAT3340 (Regression and Analysis of Variance), MATH2135 (Linear Algebra) or MATH2040 (Matrix Theory and Linear Algebra II)
- (ii) Or, 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 (publisher Prentice Hall).
- (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 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 final exam will take place during the regular exam period; the exact date to be chosen by instructor in consultation with students in order to best fit their schedules.

Component	Weight (% of final grade)	Date
<i>Midterm Exam</i>	<i>30</i>	Tuesday October 18, 2016
<i>Final exam</i>	<i>40</i>	TBD (see above)
<i>Assignments</i>	<i>30</i>	TBD (see above)

Other course requirements

None.

Conversion of numerical grades to Final Letter Grades follows the Dalhousie Common Grade Scale

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

The following chapters refer to the course text by Johnson and Wichern. The material presented in class will be drawn from these chapters.

Chapter 1:	Aspects of Multivariate Analysis
Chapter 2:	Matrix Algebra and Random Vectors
Chapter 3:	Sample Geometry and Random Sampling
Chapter 4:	The Multivariate Normal Distribution
Chapter 5:	Inferences about a Mean Vector
Chapter 7:	Multivariate Linear Regression
Chapter 8:	Principal Component Analysis
Chapter 11:	Discrimination and Classification
Chapter 12:	Cluster Analysis

ACCOMMODATION POLICY FOR STUDENTS

Students may request accommodation as a result of barriers related to disability, religious obligation, or any characteristic protected under Canadian Human Rights legislation. The full text of Dalhousie's Student Accommodation Policy can be accessed here:

http://www.dal.ca/dept/university_secretariat/policies/academic/student-accommodation-policy-wef-sep--1--2014.html

Students who require accommodation for classroom participation or the writing of tests and exams should make their request to the **Advising and Access Services Centre (AASC)** prior to or at the outset of the regular academic year. More information and the ***Request for Accommodation*** form are available at www.dal.ca/access.

ACADEMIC INTEGRITY

Academic integrity, with its embodied values, is seen as a foundation of Dalhousie University. It is the responsibility of all students to be familiar with behaviours and practices associated with academic integrity. Instructors are required to forward any suspected cases of plagiarism or other forms of academic cheating to the Academic Integrity Officer for their Faculty.

The Academic Integrity website (<http://academicintegrity.dal.ca>) provides students and faculty with information on plagiarism and other forms of academic dishonesty, and has resources to help students succeed honestly. The full text of Dalhousie's ***Policy on Intellectual Honesty*** and ***Faculty Discipline Procedures*** is available here:

http://www.dal.ca/dept/university_secretariat/academic-integrity/academic-policies.html

STUDENT CODE OF CONDUCT

Dalhousie University has a student code of conduct, and it is expected that students will adhere to the code during their participation in lectures and other activities associated with this course. In general:

"The University treats students as adults free to organize their own personal lives, behaviour and associations subject only to the law, and to University regulations that are necessary to protect

- the integrity and proper functioning of the academic and non – academic programs and activities of the University or its faculties, schools or departments;
- the peaceful and safe enjoyment of University facilities by other members of the University and the public;
- the freedom of members of the University to participate reasonably in the programs of the University and in activities on the University's premises;
- the property of the University or its members."

The full text of the code can be found here:

http://www.dal.ca/dept/university_secretariat/policies/student-life/code-of-student-conduct.html

SERVICES AVAILABLE TO STUDENTS

The following campus services are available to help students develop skills in library research, scientific writing, and effective study habits. The services are available to all Dalhousie students and, unless noted otherwise, are free.

Service	Support Provided	Location	Contact
General Academic Advising	Help with - understanding degree requirements and academic regulations - choosing your major - achieving your educational or career goals - dealing with academic or other difficulties	Killam Library Ground floor Rm G28 <i>Bissett Centre for Academic Success</i>	In person: Killam Library Rm G28 By appointment: - e-mail: advising@dal.ca - Phone: (902) 494-3077 - Book online through MyDal
Dalhousie Libraries	Help to find books and articles for assignments Help with citing sources in the text of your paper and preparation of bibliography	Killam Library Ground floor Librarian offices	In person: Service Point (Ground floor) By appointment: Identify your subject librarian (URL below) and contact by email or phone to arrange a time: http://dal.beta.libguides.com/sb.php?subject_id=34328
Studying for Success (SFS)	Help to develop essential study skills through small group workshops or one-on-one coaching sessions Match to a tutor for help in course-specific content (for a reasonable fee)	Killam Library 3rd floor Coordinator Rm 3104 Study Coaches Rm 3103	To make an appointment: - Visit main office (Killam Library main floor, Rm G28) - Call (902) 494-3077 - email Coordinator at: sfs@dal.ca or - Simply drop in to see us during posted office hours All information can be found on our website: www.dal.ca/sfs
Writing Centre	Meet with coach/tutor to discuss writing assignments (e.g., lab report, research paper, thesis, poster) - Learn to integrate source material into your own work appropriately - Learn about disciplinary writing from a peer or staff member in your field	Killam Library Ground floor Learning Commons & Rm G25	To make an appointment: - Visit the Centre (Rm G25) and book an appointment - Call (902) 494-1963 - email writingcentre@dal.ca - Book online through MyDal We are open six days a week See our website: writingcentre.dal.ca