

STAT 6300 - Fall 2009
Applied Multivariate Analysis

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Office hour:	Monday, Wednesday, Friday: 11:30 am - 12:30 am
Text:	Methods of Multivariate Analysis, 2 nd edition, by Alvin C. Rencher

Prerequisite: Fundamental Concepts of Linear Algebra; Basic Concepts of Univariate Statistical Analysis: a. Estimation, b. Hypothesis Testing, c. Regression Analysis, d. Analysis of Variance.

Attendance & Policies: This course depends on class lectures and discussion that are independent of the textbook, therefore continuous and regular attendance is vital to a satisfactory grade. Cell phones must be turned off; no text messaging, gaming or other non-class related activities will be allowed during class time.

Course Description: Multivariate Normal Distribution, Statistical Inference on One or Two Mean Vectors, Multivariate Analysis of Variance (MANOVA), Tests on Covariance Matrices, Discriminant Analysis, Classification Analysis, Multivariate Regression Analysis, Principal Component Analysis, Factor Analysis

Software: SAS for Windows will be used extensively throughout the course. On occasion, I may also use other packages such as R or Minitab for demonstration purposes. You may use any software when completing assignments (unless otherwise specified). However, you are responsible for understanding what the software is doing. You will be expected to perform some procedures without software, some with software, and some both ways on homework. While the use of software may be extensive for assignments, you will not be tested on software usage on exams.

Homework: Assignments are due at the start of class. Although collaboration among students for homework is acceptable (even encouraged), each student is responsible for their own work, written in their own words (**See ASOR_Academic_Honesty_Policy** for more information). **No late assignments will be accepted.** If you have to miss a class, you may turn your homework in early or send it with a friend. Tentative homework schedule:

August 31	September 14	September 21	September 28
October 5	October 26	November 2	November 9
November 16	December 7		

SAS output should be cut up and pasted into your report, and annotated where necessary. **Sheets of unannotated output will be ignored.**

Midterm Exam: Midterm exams will be given on or about **October 9 and November 23**. Exact exam date will be announced at least one week in advance. Textbook and one 8 ½" x 11" sheet (one-sided) of notes may be used. A calculator may also be used. Make-up exams will be given only to students who have a written medical excuse signed by a doctor or other health professional.

Final Exam: The comprehensive final will be given on **Friday, December 18, 8:30am-10:30am**. Textbook and Three 8 ½" x 11" sheet (one-sided) of notes may be used. A calculator may also be used.

Article summary and presentation: Each student must select one article or case study that proposes or illustrate a method of analysis that is related to the theme of STAT 6300.

Presentation: Your presentation should last 10-12 minutes, plus a 3-5 minutes allowance for questions.

Article Summary: The following journals are good sources for such articles:

Quality Engineering
Technometrics
Journal of American Statistical Association
The American Statistician

You can also look up the following sources that give lists of publications or abstracts of articles published in a particular year (listed by topic):

Current Index to Statistics
Statistical Theory and Methods Abstracts

Your search is not limited to the above journals. Your articles could be:

- A case study
- An article that propose or explains methods incorporated into our text or software
- A recent article proposing new methodology
- An article that compares existing competing methodologies

When you select a new article which you intend to read, summarize and present, **you must give me a copy of the article.**

Grades: Grades will be based on 10 assignments, two midterm exams and a comprehensive final exam, and an article summary & presentation. The final numerical course grade will be determined according to the following scheme:

Homework (10@10 points each)	100 points
Midterm Exams (2@100 points)	200 points
Final Exam	150 points
Article Summary and Presentation	50 points
TOTAL	500 points

We will then use the following total percentage (TPCT) scale to determine the final grade:

A	B	C	D	F
$90 \leq \text{TPCT} \leq 100$	$80 \leq \text{TPCT} < 90$	$70 \leq \text{TPCT} < 80$	$60 \leq \text{TPCT} < 70$	$\text{TPCT} < 60$

Stat 6300 Fall 2009 Tentative Course Outline (subject to change)

The topics covered and the dates they are to be covered are subject to change. The schedule is aggressive and we may not proceed at the implied pace.

Date	Reading (Reading should be completed before the given date)	Topic
8/24	Chapter 1 Chp1.doc	Introduction
8/26	Chapter 2: 2.1-2.9 Chp2.doc	Matrix Algebra
8/28	Chapter 2: 2.10-2.11 Chp2.doc	Matrix Algebra
8/31	Chapter 3: 3.1-3.7 Chp3.doc	HW#1 due Descriptive Statistics for Multivariate Data
9/2	Chapter 3: 3.8-3.9 Chp3.doc	Descriptive Statistics for Multivariate Data
9/4	Chapter 3: 3.10, 3.12 Chp3.doc	Descriptive Statistics for Multivariate Data
9/7	Chapter 4: 4.1 Chp4.doc	No Class (Labor Day)
9/9	Chapter 4: 4.2-4.3 Chp4.doc	Multivariate Normal Distribution
9/11	Chapter 4: 4.4-4.5 Chp4.doc	Multivariate Normal Distribution Review univariate statistical procedures for one sample/two samples data
9/14	Chapter 5: 5.1-5.3 Chp5.doc	Tests on one or Two Means Vectors: Tests on u HW#2 due
9/16	Chapter 5: 5.4 Chp5.doc	Tests on one or Two Means Vectors: Comparing 2 Mean Vectors
9/18	Chapter 5: 5.4 Chp5.doc	Tests on one or Two Means Vectors: Comparing 2 Mean Vectors
9/21	Chapter 5: 5.7-5.8 Chp5.doc	Tests on one or Two Means Vectors: Paired Observations HW#3 due
9/23	Chapter 5: 5.9 Chp5.doc	Tests on one or Two Means Vectors: Profile Analysis
9/25	Chapter 5: 5.9 Chp5.doc	Tests on one or Two Means Vectors: Profile Analysis
9/28	Chapter 6: 6.1 Chp6 (part I).doc	One-Way MANOVA: Four MANOVA tests HW#4 due
9/30	Chapter 6: 6.1 Chp6 (part I).doc	One-Way MANOVA: Four MANOVA tests
10/2	Chapter 6: 6.2 Chp6 (part I).doc	One-Way MANOVA: Test on individual variables following Rejecting overall MANOVA tests
10/5	Chapter 6: 6.3 Chp6 (part I).doc	One-Way MANOVA: Contrast HW#5 due
10/7	Chapter 6: 6.4 Chp6 (part I).doc	One-Way MANOVA: Measures of multivariate association

10/9		Midterm Exam I
10/12	Chapter 6: 6.5-6.6 Chp6 (part II).doc	No Class (Fall Break)
10/14	Chapter 6: 6.5-6.6 Chp6 (part II).doc	Two-Way MANOVA
10/16	Chapter 6: 6.5-6.6 Chp6 (part II).doc	Two-Way MANOVA
10/19	Chapter 6: 6.6 Chp6 (part II).doc	Higher order MANOVA and Mixed Models
10/21	Chapter 6: 6.8 Chp6 (part III).doc	One -Way MANOVA: Profile Analysis
10/23	Chapter 6: 6.9 Chp6 (part III).doc	One Sample Repeated Measures Designs
10/26	Chapter 6: 6.9 Chp6 (part III).doc	K- Sample Repeated Measures Designs HW#6 due
10/28	Chapter 8	Discriminant Analysis
10/30	Chapter 8	Discriminant Analysis
11/2	Chapter 8	Discriminant Analysis HW#7 due
11/4	Chapter 8	Discriminant Analysis
11/6	Chapter 9	Classification Analysis
11/9	Chapter 9	Classification Analysis HW#8 due
11/11		No Class (Veterans Day)
11/13	Chapter 12	Principal Component Analysis
11/16	Chapter 12	Principal Component Analysis
11/18	Chapter 12	Principal Component Analysis
11/20	Review & Catch up	Questions and Answers HW#9 due
11/23		Midterm Exam II
11/25		No Class (Thanksgiving Day)
11/27		No Class (Thanksgiving Day)
11/30	Chapter 13	Factor Analysis
12/2	Chapter 13	Factor Analysis
12/4	Chapter 13	Factor Analysis
12/7	Presentation	
12/9	Presentation	HW#10 due
12/11	Presentation	Questions and Answers
12/18	8:30am-10:30am	Final Exam

- We will also cover Multivariate Regression Analysis (Chapter 10) if time permits.