

Stevens Institute of Technology
School of Business
Business Intelligence & Analytics Program

Syllabus
BIA-652-D: Multivariate Analysis

Fall 2018	
Instructor name and contact information Amir H Gandomi, PhD Tel: (201) 216-5029 a.h.gandomi@stevens.edu https://web.stevens.edu/facultyprofile/?id=2273	<u>Office Hours:</u> Thursday 2 – 6 pm or by Appointment <u>Contact: use Canvas message or Stevens Email with BIA-652 in subject line.</u>

Overview

This course introduces basic methods underlying multivariate analysis. Students will master techniques used for dimension reduction, pattern recognition, classification, and forecasting. They will build expertise in applying these techniques to real data through class exercises and a project, and learn how to visualize data and present results. This proficiency will enable students to become sophisticated data analysts, and to help make more informed design, marketing, and business decisions. You are free to use either of SAS, R or Python for the assignments while the text book focuses on the use of R and SAS.

Prerequisites: Student is expected to be familiar with statistics. Otherwise, student may be required to take MGT 502 with no credit. Permission instructor required.

Introduction to Course

The explosive growth of many businesses, government, and scientific databases, over the last decade, has placed an increasing demand for the ability to analyze large sets of data. Much, if not most, of this data is multivariate often with a large number of dimensions. This course is intended as an introduction to the techniques available to analyze multivariate data, along with tools to conduct analyses

Learning Goals

After taking this course, the student will be able to:

- use a statistical software to analyze multivariate data
- visualize multivariate data and communicate results
- recognize pattern, classify information, and forecast events
- think critically about data and research findings
- present findings
- read and execute multivariate analysis techniques not covered in class
- help make business recommendations based on results from multivariate analysis

Pedagogy

The course will employ lectures, class discussion, in-class individual and team assignments, and individual and team homeworks and projects. Students will make presentations during the class. A Project based on multivariate data of their own choice will be developed and executed during the semester by each student. The result is documented and presented at the class.

Required Text(s)

1. Afifi, A., May, S., & Clark, V. A. (2011). Practical multivariate analysis. Fifth Edition, CRC Press. ISBN 9781439816806
<http://www.crcpress.com/product/isbn/9781439816806>

Assignments

There will be weekly exercises and a late-term test. A final project: an Extensive investigation of a student selected dataset including execution, documentation and presentation of the result.

The final project papers / presentations are due prior to the last two meetings

Assignment	Grade Percent
Presentation of Homework Assignments	25%
Late term test	30%
Final project / write-up and presentations	45%
Total Grade	100%

Ethical Conduct

The following statement is printed in the Stevens Graduate Catalog and applies to all students taking Stevens courses, on and off campus.

“Cheating during in-class tests or take-home examinations or homework is, of course, illegal and immoral. A Graduate Academic Evaluation Board exists to investigate academic improprieties, conduct hearings, and determine any necessary actions. The term ‘academic impropriety’ is meant to include, but is not limited to, cheating on homework, during in-class or take home examinations and plagiarism.”

Consequences of academic impropriety are severe, ranging from receiving an “F” in a course, to a warning from the Dean of the Graduate School, which becomes a part of the permanent student record, to expulsion.

Reference: The Graduate Student Handbook, Academic Year 2003-2004 Stevens Institute of Technology, page 10.

Consistent with the above statements, all homework exercises, tests and exams that are designated as individual assignments MUST contain the following signed statement before they can be accepted for grading.

I pledge on my honor that I have not given or received any unauthorized assistance on this assignment/examination. I further pledge that I have not copied any material from a book, article, the Internet or any other source except where I have expressly cited the source.

Signature _____

Date: _____

Please note that assignments in this class may be submitted to www.turnitin.com, a web-based anti-plagiarism system, for an evaluation of their originality.

Course Schedule

Lecture Number	Date	Topic Covered/Readings/Assignments
1.	08/28	1. Introduction to Multivariate Data Analysis 2. Review of Univariate Probability and Statistics
2.	09/04	1. Completion of Review of Univariate 2. Text Chapters 1 – 5
3.	09/11	1. Review of Simple Linear Regression 2. Introduction to Multivariate Analysis
4.	09/18	1. Multiple Linear Regression - Chapter 7 2. Matrix Algebra (if needed) Notes
5.	09/25	1. Linear Discriminant Analysis - Chapter 11 2. K Nearest Neighbor (not in text)
6.	10/02	3. Logistic Regression - Chapter 12 4. Naïve Bayes (not in text)
7.	10/09	No Class
8.	10/16	1. Ensemble methods 2. Cluster Analysis - Chapter 16
9.	10/23	1. Principal Component Analysis - Chapters 14 2. Singular Value Decomposition (not in text)
10	10/30	1. Factor Analysis - Chapter 15
11.	11/6	TBD
12.	11/13	1. Late Term Test
13.	11/20	1. A Case Study 2. Project Discussion
14.	11/27	1. Project Presentations
15.	12/04	1. Term Paper