Statistics 467/567: Advanced Multivariate Methods
Summer 2020

Textbook: Johnson, R.A., Wichern, D.W. (2007) *Applied Multivariate Statistical Analysis*. Upper Saddle River, NJ: Pearson, Prentice-Hall.
Room: CHEMCIAL BIO Rm# 1303, Busch Campus, Monday, Wednesday 6:00 to 8:10 p.m.; 8:30 to 10:00 p.m.
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Objectives: Learning goals of this course are logic and steps to multivariate analysis and formulating a scientific paper, which include: how to create data sets, distinguish among different types of variables, decide which methods to apply given the constraints of the data, conduct analyses and report findings. Other key objectives include: computation using statistical/mathematical software, data analysis, preparation tables, graphs, and summarizing results suitable for submission in refereed publications. Oral communication and presentation of research hypotheses to peers is also a fundamental component of advanced multivariate methods.
Grading: Project 1: Data Set Creation 6-8 variables; Hypotheses; UNIVARIATE AND BIVARIATE Analysis; Results; Discussion 7-10 pages; can work alone or in groups of two. (35%)
Project 2: Data Set Creation 10 variables; Hypotheses; MULTIVARIATE Analysis; Results; Discussion 10-15 pages; can be an individual or joint. (50%)
Attendance: Attendance, participation in class and presentation of findings. (15%)
Note: Suggestion: create ONE Data Set (use Data Set 1 and add variables given the unit of analysis is the same).

Reports: Format will follow general structure as delineated below:

A. Introduction

Describe the research question or hypothesis addressing:

-Who
-What
-Where
-When
-Why
- How

Literature Review to support argument (i.e. using existing evidence on which to build hypothesis and now why testing)

B. Methods

- Explain variables .
- Justify why chose that analysis.
- What goal to be achieved

C. Results

- Tables
- Graphs

D. Discussion

- Draw a conclusion; interpret results; explain why relevant to that research discipline; address limitations of study; implications for further research

E. Literature Cited - References, i.e. Bibliography

Syllabus

Date	Topic	Location
July 6, 2020	-Syllabus, How to Create a Data Set and Abstract, Data Sets Available Chapter 1 - Aspects of Multivariate Analysis	CHEM BIO 1303
July 8, 2020	**Assignment Due: Data Set for Project No. 1 Created** Chapter 2 - Matrix Algebra and Random Vectors Chapter 3 - Sample Geometry and Random Sampling	CHEM BIO 1303
July 13, 2020	**Assignment Due: Abstract and Outline of Analysis for Project No. 1** Chapter 3 - Sample Geometry and Random Sampling Chapter 4 - The Multivariate Normal Distribution	CHEM BIO 1303
July 15, 2020	Chapter 4 - The Multivariate Normal Distribution Chapter 5 - Inferences About a Mean Vector	CHEM BIO 1303
July 20, 2020	**Assignment Due: Project No. 1 - Due - Univariate and Bivarate** Application of Methods Chapters 1 through 5 - Outline to be Provided Chapter 5 - Inferences About a Mean Vector Chapter 6 - Comparison of Several Multivariate Means	CHEM BIO 1303
July 22, 2020	**Assignment Due: Abstract & Outline of Analysis for Project No. 2** Chapter 6 - Comparison of Several Multivariate Means Chapter 7 - Multivariate Linear Regression Models	CHEM BIO 1303
July 27, 2020	Chapter 7 - Multivariate Linear Regression Models Chapter 8 - Principal Components	
July 29, 2020	**Project No. 2 - Due - Bivariate-Multivariate Analysis ABSTRACT** Chapter 8 - Principal Components Chapter 9 - Factor Analysis and Inference for Structured Covariance Matrices	CHEM BIO 1303
August 3, 2020	**Assignment Due: Abstract & Outline for Project No. 2** Chapter 9 - Analysis and Inference for Structured Covariance Matrices Chapter 10 - Canonical Correlation Analysis	CHEM BIO 1303
August 5, 2020	Chapter 10 - Canonical Correlation Analysis Chapter 11 - Discrimination and Classification	CHEM BIO 1303
August 10, 2020	Chapter 11 - Discrimination and Classification Chapter 12 - Clustering, Distance Methods and Ordination	CHEM BIO 1303
August 12, 2020	Chapter 12 - Clustering, Distance Methods and Ordination	CHEM BIO 1303
	Final Project No. 2 - Paper - Due - Univariate; Bivariate; Multivariate In class Student Presentations - Final Project - 15 minutes each	