APSTA-GE.2004

Advanced Modeling I: Topics in Multivariate Analysis

**Class Meeting Time/Room:**

Tuesday, 3:30 - to 6:10pm Remote/Synchronous; also Asynchronous

**Lab Meeting Times/Attendance:**

**Lab Times**:       Tue 7:00-8:10pm   OR   Wed 7:00-8:10pm

**Attendance:**      Although optional, attendance in lab is strongly encouraged.The lab provides additional software demonstrations of what is discussed in class, and hands-on guidance for completing homework assignments.

**Course Objectives:**

The objectives of this course are to provide students with an introduction to some of the more advanced topics in multivariate analysis for the behavioral, social, and health sciences. Beginning with matrix algebra, this seven-week course extends the material covered in APSTA-GE.2003 and covers the following topics: repeated measures analysis of variance, multivariate analysis of variance, discriminant analysis, canonical variate analysis, principal component analysis, exploratory factor analysis, and multidimensional scaling. The software platforms for the course are Stata and R.  Both R scripts and Stata .do-files are posted on the class website to give students flexibility in working with either Stata or R.  Students may submit homework assignments in either Stata or R.

**Course Orientation:**

Although the mathematical and theoretical underpinnings of the multivariate methods will be covered, the course will have an applied focus.  Accordingly, the analysis of multivariate data and the interpretation of results will be stressed.

**Prerequisites:**  
APSTA-GE.2003 or the equivalent.  Prior to the 1st class, materials on matrix algebra will be distributed along with some exercises (and solutions to them) to test your knowledge of the material covered.

**Website:**  
My Classes will be used for posting lecture notes, handouts, readings, homework assignments, and general information.  All postings will appear in relevant folders under the *Resources* tab.

**Readings:**

In addition to detailed course lecture notes, supplementary lecture notes and chapters from published texts will be posted on the class website to facilitate learning.

**Course Requirements & Grading:**

**Homework:** Practicing what has been covered in class is essential to learning statistics. Homework will be assigned weekly. Students will be responsible for completing all homework assignments on time and submitting their completed assignments via the My Classes website.  Students also will be responsible for participating in class.

**Grading:**

10%                 Class attendance and participation

90%                 Computer-based homework assignments

**Syllabus:**

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| *APSTA-GE.2004 Syllabus – Advanced Modeling I: Topics in Multivariate Analysis – SP 2021* | | | |
| *Month* | *Day* | *Topic* | *Reading* |
| Prior to 1st Class |  | Intro to Matrix Algebra: Reading Materials and Exercises with solutions | Lecture Notes #0;  Chapter 2, Green & Carroll text. |
| February | 02 | Course Overview; Repeated Measures Analysis of Variance | Lecture Notes #1; Chapter 22, Warner; pp. 916-948; 955-957 |
|  | 09 | Discriminant Analysis | Lecture Notes #2;  Supplementary Handout;  Chapter 7, Stevens |
|  | 16 | Multivariate Analysis of Variance | Lecture Notes #3;  Chapter 7, Tabachnick & Fidell |
|  | 23 | Canonical Variate Analysis | Lecture Notes #4;  CVA and Related Techniques by Darlington, Weinberg, & Walberg. In *RER*.  Chapter 5, Marascuilo & Levin |
| March | 2 | Principal Components Analysis | Lecture Notes #5;  Chapter 11, Stevens |
|  | 9 | Exploratory Factor Analysis | Lecture Notes #6;  Chapter 12A, Meyers, Gamst, & Guarino. |
|  | 16 | Multidimensional Scaling | Lecture Notes #7;  An Intro to MDS by Weinberg. In *Measurement and Evaluation in Counseling and Development*. |