Course Syllabus
EDU 7314: Advanced Multivariate Statistics

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Text:


Course Description:
“This course is designed to broaden and enrich the student's knowledge and understanding of statistical methodology as it pertains to the study of multivariate techniques used in the behavioral sciences.” (SMU Catalog)

The goal of this course is to develop skills with a range of procedures and programs for multivariate data analysis. The focus will be on practical issues such as selecting the appropriate analysis, preparing data for analysis, menu-driven and syntax programming, interpreting output, and presenting results of a complex nature.

Possible topics to be covered include multivariate data screening, analysis of covariance, MANOVA, discriminant analysis, cluster analysis, multidimensional scaling, factor analysis, profile analysis, path analysis, structural equation modeling, hierarchical linear modeling, and meta analysis. Different semesters this course is taught will have slightly-different “flavors” of analyses. Topics for coverage are also somewhat driven by student interests.

The primary approach to the course will be analytical/logical. It is important to understand why and how we use the methods rather than just being able to get the correct answer (which, of course, is also important!). Some mathematics, however, will be necessary to understand course content. Heavy emphasis will be placed on understanding relationships between general linear model analyses (e.g., Pearson r, t-test, ANOVA, regression, etc.).

There are multiple assignments and expectations for this course. Please remain aware of due dates and subsequent penalties. The content builds upon previously learned information so it is necessary that students keep up. If you are having any difficulty, please do not hesitate to see me ahead of time - not after missing an assignment.
Other Recommended Texts (as supplements if desired/needed):
As another regression text (a more detailed, mathematical treatment):

For help with programming in R:

For help with reading statistics for understanding:

Guide for APA style:

Course Evaluation:                      Grading Scale:
Mid-term exam                        25%  90-100%  A
Final exam                           25%  80-89%   B
Paper                                30%  70-79%   C
Homework/Computer Assignments       20%  60-69%   D
                                   < 60%  F

Projects:
Two major examinations will be given as midterm and final exams. These exams will involve use of the methods learned in class to analyze, interpret, and explain data from various research scenarios. In general, you will be given research scenarios along with a data set (or sets) that corresponds to the scenario(s). You will be asked to answer the research questions by running the correct analyses, interpreting the results, and writing up your results in a format suitable for a journal article. Guidance will be given in class about more specific expectations for these projects. Any project handed in after the due date will result in lowering your project grade by one letter grade for every calendar day it is late. (For example, if the project is handed in the day after the due date, then the project grade will be lowered by 10 points. If the project is handed in the day after that, then it will be 20 points. Etc.) These projects should be completed individually.

Paper:
A paper on a methodologically related topic of your choice will also be required. Students must select a topic by the beginning of second class period and have it approved by myself (to avoid duplicate topics and ensure relevancy). Topics will be allowed on a first come, first served basis. You may speak with me at any time to help decide on a topic if you need direction.

The purpose of the papers should generally be to discuss a methodological topic in a manner that explains and demonstrates the topic in sufficient detail and clarity that other students in this class
could benefit from receiving a copy of the paper. Almost always, this means including a data set (often small, and made-up) with which you illustrate some analysis, including tables and portions of R output and syntax as needed.

Papers must be formatted appropriately for a conference presentation (see APA manual) and will be graded on technical accuracy, completeness, clarity, and writing quality. You should write concisely and professionally.

Papers must follow APA style. Once I encounter 10 APA style errors when grading your paper, I will lower your paper grade by one-half a letter grade. I will lower your paper grade another one-half a letter grade for each additional 8 APA style errors found (this includes repetitive errors).

Your paper is due in hard copy a week before the final exam. Please note that the paper consists of 30% of your grade. As such, you are advised to think about the paper early in the semester. All late papers will penalized one letter grade for each day late (in addition to any style error problems).

I am willing to answer any questions that you have concerning your paper at any time. This includes but is not limited to help with references, developing and outline, understanding the material, how to set up an example, etc. However, I will not read/edit a full draft of your paper before I grade it. This essentially amounts to me grading something that I have helped write or agreed to previously, and I tend to be fond of my own work! Please do not let this stipulation keep you from seeking help when needed (e.g., APA style questions, content issues, possible outlines).

**Homework:**
Homework assignments (mostly R computer assignments) will also be required. These will be assigned in class and due dates established then. If you miss a class and an assignment was made, you of course are still responsible for the assignment by the established due date. So, you should be in contact with a classmate to see if anything was assigned. Failure to hand in an assignment by the due date will lower the assignment grade by one letter grade for each class period that elapses (same examples as with the Projects above, except that it is the assignment grade that would be lowered).

**Additional help:**
I am willing to meet at any time we can arrange with individuals or groups of students to discuss the content of the course. I highly recommend that you meet regularly with a study group to review the concepts learned in class. Any review meetings will be guided by student questions or comments. If there are no questions, then the review session will end quickly. You should think critically about the material and bring your ideas to review sessions.
**TENTATIVE Course Outline** (additional readings will be added in class):
Topics to be covered in the course

a) Review of previous topics  
b) Repeated Measures Analysis  
c) Matrix algebra.  
d) The multivariate normal distribution, Hotelling's $T^2$ and Wilk's Lambda criterion for significance tests of group differences (one-way MANOVA).  
e) Factor Analysis. Rotation techniques.  
f) Confirmatory Factor Analysis  
g) MANOVA and MANCOVA  
h) Discriminant analysis.  
i) Canonical correlation.  
j) Multiple independent variables with multiple dependent variables (two-way MANOVA).  
k) Structural Equation Modeling and Path Analysis
Course Policies and Professionalism

Technology Requirements (E-mail): You will be required to check your SMU e-mail at least once per week or as frequently as requested by the instructor. If you have problems logging in, click on “How to Log On.” You may choose to direct e-mail to an alternate account, but university policy requires that you check your SMU account as well.

Attendance and Participation: Students are expected to attend all classes, arriving on time and staying until dismissed. You are also expected to be prepared for class (with required readings or other assignments completed) and participate actively in all class discussions and activities. Points will be deducted for absences, tardiness, leaving early, lack of preparation or lack of participation.

If you need to be absent because of an illness, an emergency, or to attend to “school business,” contact the instructor (e-mail or voice mail) PRIOR to class and consult a colleague to determine what you missed and to get class notes. It is not the instructor’s responsibility to re-teach information missed, although the instructor will be available, as always, to answer specific questions about course content.

Missing more than 3 classes (20% of the total classes) will result in automatic failure, unless there is a documented, valid medical reason or emergency. Documentation must be presented to the instructor. Additionally, the instructor may require an extra assignment to make up for classes missed.

Late assignments: Assignments are expected to be turned in before class on the date they are due (see Course Calendar). Assignments are typically given to the instructor personally. Assignments not given in person to the instructor must be given in person to an assistant (Kerri Koury, 214-768-4889 OR Malissa Cloer, 214-768-8400) or mailed through the US postal service, postmarked by the due date of the assignment. Assignments left in an instructor’s mailbox or on a desk will not be accepted. Our usual office hours are M-F 8:00 to 5:00. Our address is: Department of Literacy, Language, and Learning, 3108 Fondren, Dallas, TX 75205.

Disability Accommodations: Students needing academic accommodations for a disability must first contact Ms. Rebecca Marin, Coordinator, Services for Students with Disabilities (214-768-4557) to verify the disability and establish eligibility for accommodations. They should then schedule an appointment with the professor to make appropriate arrangements. (See University Policy No. 2.4.)

Religious Observance: Religiously observant students wishing to be absent on holidays that require missing class should notify their professors in writing at the beginning of the semester, and should discuss with them, in advance, acceptable ways of making up any work missed because of the absence. (See University Policy No. 1.9.)
Excused Absences for University Extracurricular Activities: Students participating in an officially sanctioned, scheduled University extracurricular activity should be given the opportunity to make up class assignments or other graded assignments missed as a result of their participation. It is the responsibility of the student to make arrangements with the instructor prior to any missed scheduled examination or other missed assignment for making up the work. (University Undergraduate Catalogue)

Honor Code: The honor code of Southern Methodist University governs all work in this course. Students should review their student handbook of the code. Cheating will result in automatic failure of the class.

Withdrawing from class: It is your responsibility to check the SMU website (academic calendar) for add/drop and withdraw dates.

Cell Phones: Please do not make or receive calls in class. If you have a cell phone, put it on silent mode. If because of an emergency, you feel you must take a call, please let me know ahead of time. If you forget to turn your phone off and it rings, please stop the ringing as quickly as possible. Under no circumstances should you begin a conversation in the classroom.

Obtaining Assistance: We are very committed to your progress! We are available to provide you with the assistance you need to demonstrate proficiency with course content. It is your responsibility to seek assistance with course projects and assignments in a timely fashion.