

EDRS 821: Advanced Applications of Quantitative Methods (3 credits)
College of Education and Human Development, PhD Program

Fall 2020 CRN 74311 Section DL1
Wednesday, 4:30pm



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Prerequisite: Successful completion of EDRS 811 or the equivalent (knowledge of univariate statistics including ANOVA models).

Catalog Description: Advanced study of applications of quantitative methods in educational research, reinforcing and building on concepts and skills acquired in EDRS 811. Uses modular approach, and provides advanced study of techniques appropriate to survey research, group-experimental and quasi-experimental research, selected multivariate procedures and factor analysis, and quantitative synthesis (meta-analysis) of research. Combines reading assignments, critiques, and discussion of relevant journal articles; and application activities.

Course Description: This course will provide advanced study of applications of quantitative methods in the practice of educational research and will reinforce and build upon concepts and skills acquired in EDRS 811. It will employ a modular approach and will contain advanced study of techniques appropriate to analysis of data from tests and surveys; group-experimental and quasi-experimental design; selected multivariate procedures and factor analysis. Students will learn through a combination of text reading assignments, critical analysis of professional journal articles, and hands-on experience in using a computer program for data analysis, and application activities. Students will be expected to identify and report on quantitative methods used in published research, to analyze data using R (a free software environment) and/or the Statistical Package for Social Sciences (SPSS), and to provide written reports of methodology and results.

Course goals: This course is a one-semester introduction to several widely used multiple regression (MR) and multivariate statistical methods. By the end of the semester, it is expected that you will be able to:

- Demonstrate a conceptual understanding of multiple regression with mediators and moderators and generalized linear modeling (e.g., logistic regression) as evidenced by your ability to select and justify the statistic that is appropriate to test a particular hypothesis, explain what the procedure is accomplishing and the logic underlying the given procedure.
- Explain what is meant by multivariate statistical techniques and demonstrate the ability to use multiple techniques that are introduced in this class.

- Explain the assumptions of the above analyses and make recommendations when assumptions are violated.
- Conduct all of the statistical techniques noted above using SPSS software, including testing the assumptions of the technique, interpret the results of the SPSS output and write the results in APA publication style.

Course Delivery Method

This course will be delivered online (76% or more) using both an asynchronous and synchronous format via Blackboard Learning Management system (LMS) housed in the MyMason portal. You will log in to the Blackboard (Bb) course site using your Mason email name (everything before @masonlive.gmu.edu) and email password.

Under no circumstances, may candidates/students participate in online class sessions (either by phone or Internet) while operating motor vehicles. Further, as expected in a face-to-face class meeting, such online participation requires undivided attention to course content and communication.

Technical Requirements

To participate in this course, students will need to satisfy the following technical requirements:

- High-speed Internet access with standard up-to-date browsers. To get a list of Blackboard's supported browsers see:
https://help.blackboard.com/Learn/Student/Getting_Started/Browser_Support#supported-browsers
- To get a list of supported operation systems on different devices see:
https://help.blackboard.com/Learn/Student/Getting_Started/Browser_Support#tested-devices-and-operating-systems
- Students must maintain consistent and reliable access to their GMU email and Blackboard, as these are the official methods of communication for this course.
- Students may be asked to create logins and passwords on supplemental websites and/or to download trial software to their computer or tablet as part of course requirements.

Expectations

- Course Week: Our week will start on Monday and finish on Sunday. Synchronous meetings will take place on Wednesday at 4:30.
- Log-in Frequency: Students must actively check the course Blackboard site and their GMU email for communications from the instructor, class discussions, and/or access to course materials at least 2 times per week.
- Participation: Students are expected to actively engage in all course activities throughout the semester, which includes viewing all course materials, completing course activities and assignments, and participating in course discussions and group interactions.
- Technical Competence:

Students are expected to demonstrate competence in the use of all course technology. Students who are struggling with technical components of the course are expected to seek assistance from the instructor and/or College or University technical services.

- Technical Issues:

Students should anticipate some technical difficulties during the semester and should, therefore, budget their time accordingly. Late work will not be accepted based on individual technical issues.

- Workload:

Please be aware that this course is **not** self-paced. Students are expected to meet *specific deadlines* and *due dates* listed in the **Class Schedule** section of this syllabus (and updated online in Bb). It is the student's responsibility to keep track of the weekly course schedule of topics, readings, activities and assignments due.

- Instructor Support:

Students may schedule a one-on-one meeting to discuss course requirements, content or other course-related issues. These meetings with the instructor will take place via telephone or web conference. Students should email the instructor to schedule a one-on-one session, including their preferred meeting method and suggested dates/times.

- Netiquette:

The course environment is a collaborative space. Experience shows that even an innocent remark typed in the online environment can be misconstrued. Students must always re-read their responses carefully before posting them, so as others do not consider them as personal offenses. *Be positive in your approach with others and diplomatic in selecting your words.* Remember that you are not competing with classmates, but sharing information and learning from others. All faculty are similarly expected to be respectful in all communications.

- Accommodations:

Online learners who require effective accommodations to insure accessibility must be registered with George Mason University Disability Services.

Required Materials:

(1) Tabachnick, B.G. & Fidell, L. S. (2019). Using Multivariate Statistics. (7th Ed.). NY: Pearson Education. ISBN: 9780134790541

(2) Access to R and/or SPSS software. R (<https://www.r-project.org>) is a free software environment that runs on a variety of platforms. You can access SPSS software through GMU's Citrix Virtual Lab at <https://mymasonapps.gmu.edu>. Citrix is accessible through Mason's Virtual Private Network (VPN). It is the student's responsibility to ensure access to one of these software programs.

(3) There are also some required articles/book chapters that will be posted on Bb.

Recommended Resources:

American Psychological Association (2019). *Publication Manual of the American Psychological Association (7th edition)*. Washington, DC: APA.

Note: In weeks one and two of the class, students are expected to review the reporting standards for statistics in APA style. Student may complete an optional short assignment covering the standards to verify knowledge. Feedback will be provided.

My Teaching Philosophy (in a nutshell) and Expectations

Many people tend to think of statistics as a static and “cut and dry” field when, in fact, it is neither. Advances in computing have enabled the rapid development of more sophisticated modeling tools. There is no way that you will ever know and understand all of them. What you need to understand are the basic assumptions underlying different models, how to select among them, and where to go to get information to learn more if you need something new.

As doctoral students, my main goal for you is to help you become *expert learners*. It is not realistic for me to be your only source of information, nor is it a viable learning model for the scientists and researchers that you are becoming. Make use of the many resources that are easily available on the web and work with one another.

The most important thing you can bring with you to class is a willingness to try to conceptually understand the material. *Please be active--ask questions and participate*. Outside of class, remember that reading statistical information takes a long time, and even when you read slowly and deliberately, you will need to go back and revisit it over and over. Many people find that this is not easy material; you should accept struggles as a normal part of the learning process.

ASSESSMENT:

Online Quizzes (10%): For each topic there will be a short quiz posted on Blackboard. The quizzes are composed of short answer and multiple choice items which will cover the basic concepts presented in class and in the textbook. Quizzes are timed (usually 25 minutes) and must be completed during the specified time period (due by midnight on Sundays). These quizzes are designed to provide you (and me) with feedback about your course progress. Your quiz score cannot lower your overall course grade. **Please take the quiz as soon after watching the video as possible.**

Annotated Analysis (15%): Each week you will work with data to replicate class or textbook analyses and/or run new analyses either individually or with a partner. The exercise may also include conceptual questions about the method to help you gain conceptual understanding as you work through the exercises. You may work together or individually on running the analysis; however your responses to the questions and annotations should be a collaborative effort if you are submitting with a partner. You /Your group will upload your annotated output (please cut and paste relevant output to Word) and responses. You will make corrections to your analyses before writing up and submitting a write-up of results (see later section).

Full Write Up of Regression Results (10%): For the multiple regression assignment you will write a complete “dissertation style” methods and results section in **correct APA format** including (1) data cleaning (2) testing of appropriate assumptions, (3) inclusion of any necessary preliminary descriptive statistics and tables (4) results of hypotheses tests, and (4) interpretation of results.

Class Participation (10%): We will be learning several new statistical analyses. There will be multiple places to engage in conversations about what you are learning. (1) Piazza will be used for questions/comments/thoughts on individual analysis assignment. (2) Weekly meetings to discuss analysis methods and ask questions. It is expected that you will have watched the narrated video on that week's topic and completed the online quiz. At the class meeting we will complete a lab activity in breakout groups and discuss our findings together. Your participation in the small group and whole group debrief session is expected. (3) In addition to the textbook readings, there will be an example article that is an application of the method we are learning. Please read this example article by the specified due date. You will then participate in a Bb discussion board that will be set up for the article. The commentary should be an informal set of questions and comments, or perhaps a short summary of information (summarize only if you cannot think of anything else to say) about the article. The purpose of this assignment is to provide information for class discussion and to help me identify sources of confusion in your understanding of the usage of the statistical method. Your commentary and engagement in the discussion board are scored on a 2 point scale: 2 (complete and well considered), 1(did not read thoroughly/lacking effort), or 0 (did not read/minimal effort/late/nothing submitted). There are 8 total topics; you may skip two (freebie!) for the semester.

'Article Style' Write Up of Results (15%): These results are based on the analysis from your groups work on **3** of the topics. Each student may select which 3 topics they would like to work on writing up. You will write a results section in **correct APA format** including: results of hypotheses tests and interpretation of results similar to what would be found in a published research article. *Note: Necessary tables should also be included and should be formatted in correct APA style (cutting and pasting from SPSS is not acceptable).* Results are submitted individually and even though they are based on the SPSS output that you may have worked on with a partner they should reflect your individual interpretation and presentation. Duplicate work is considered plagiarism and will receive a score of 0.

Exams (20% each): The two exams will cover the material from the class and textbook and include short answer questions as well as interpretation of SPSS output.

GRADING SCALE:

Grades will be assigned based on the following:

A+	98-100%	B+	88-89%	C	70-79%
A	93-100%	B	83-87%	F	below 70%
A-	90-92%	B-	80-82%		

Final grades are based in the assessments described above. "Extra credit" is not available.

Late Assignments: *As a general rule, late assignments will not be accepted.* If you believe you have EXCEPTIONAL circumstances and wish to negotiate to have extra time to complete course work, you must discuss this with me before the day the assignment is due. (Negotiating means that you will be sacrificing a portion, perhaps substantial, of your grade for extra time).

GMU Policies and Resources for Students

Policies

- Students must adhere to the guidelines of the Mason Honor Code (see <https://catalog.gmu.edu/policies/honor-code-system/>).
- Students must follow the university policy for Responsible Use of Computing (see <http://universitypolicy.gmu.edu/policies/responsible-use-of-computing/>).
- Students are responsible for the content of university communications sent to their Mason email account and are required to activate their account and check it regularly. All communication from the university, college, school, and program will be sent to students **solely** through their Mason email account.
- Students with disabilities who seek accommodations in a course must be registered with George Mason University Disability Services. Approved accommodations will begin at the time the written letter from Disability Services is received by the instructor (see <https://ds.gmu.edu/>).
- Students must silence all sound emitting devices during class unless otherwise authorized by the instructor.

Campus Resources

Support for submission of assignments to Tk20 should be directed to tk20help@gmu.edu or <https://cehd.gmu.edu/aero/tk20>. Questions or concerns regarding use of Blackboard should be directed to <https://its.gmu.edu/knowledge-base/blackboard-instructional-technology-support-for-students/>

- For information on student support resources on campus, see <https://ctfe.gmu.edu/teaching/student-support-resources-on-campus>

Professional Dispositions

See <https://cehd.gmu.edu/students/policies-procedures/>

Core Values Commitment

The College of Education and Human Development is committed to collaboration, ethical leadership, innovation, research-based practice, and social justice. Students are expected to adhere to these principles: <http://cehd.gmu.edu/values/>.

Notice of mandatory reporting of sexual assault, interpersonal violence, and stalking:

As a faculty member, I am designated as a “Responsible Employee,” and must report all disclosures of sexual assault, interpersonal violence, and stalking to Mason’s Title IX Coordinator per University Policy 1202. If you wish to speak with someone confidentially, please contact one of Mason’s confidential resources, such as Student Support and Advocacy Center (SSAC) at 703-380-1434 or Counseling and Psychological Services (CAPS) at 703-993-2380. You may also seek assistance from Mason’s Title IX Coordinator by calling 703-993-8730, or emailing titleix@gmu.edu.

For additional information on the College of Education and Human Development, please visit our website <https://cehd.gmu.edu/students/> .

Tentative Schedule

	Class	Topic	Reading	Submissions
8/26	1	Intro to Advanced Quant Intro to R Review: ANOVA/ ANCOVA Cleaning Data	Chapter 1 Chapter 2:overview *Review ch. 3 & ch. 6 as needed Chapter 4	
9/2	3	MANOVA/ MANCOVA	Chapter 7	APA style review
9/9	2	Multiple Regression Assumptions Categorical Predictors Hierarchical Regression	Chapter 5 (5.1- 5.3, 5.7.1-5.7.3) Chapter 5 (5.4-5.6.4)	#1 MAN(C)OVA
9/16	4	MR-Moderation (cat.)	Pdf on Bb Chapter 5 (5.6.6)	MR analyses
9/23	5	MR-Moderation (cont.)	Pdf on Bb	
9/30	6	MR-Mediation	Chapter 5 (5.6.7) Pdf on Bb	#2: Mod
10/7	7	Catch-up		#3: Med
10/14	8	Exam 1		
10/21	9	Discriminant Analysis	Chapter 9	
10/28	10	Logistic Regression	Chapter 10	#4: DA
11/4	11	Exploratory Factor Analysis	Chapter 13 (13.1-13.4)	#5: Log
11/11	12	Cluster Analysis	Pdf on Bb	#6: EFA
11/18	13	Reading Results: HLM & SEM	(Ch.14 & ch.15)	#7: CA
11/25		Thanksgiving Break-No Class		
12/2	14	Catch-up & Review		Last Day to Submit Write-ups
12/9	15	Exam 2		