

George Mason University
College of Education and Human Development
Educational Psychology and Research Methods

EDRS 811.001 – Quantitative Methods in Educational Research
3 Credits, Spring 2022
Mondays, 4:30-7:10 PM
Thompson Hall L014

Faculty

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Prerequisites/Corequisites

B- or higher and satisfactory completion of EDRS 810. Successful completion of EDRS 620 (or its equivalent) or permission of instructor. *Note: The first few weeks of the semester will be a review of material that you have already been exposed to (principles of research, descriptive statistics, normal distribution, hypothesis testing).*

University Catalog Course Description

Emphasizes advanced methods of conducting research using quantitative methods of data collection, and analysis appropriate for research in education. Includes design of experimental and quasi-experimental research studies, and methods of analysis appropriate to these studies, including analyzing variance and multiple linear regression.

Course Overview

The purpose of this course is to develop students' understanding of statistical ideas and procedures required for conducting statistical analyses and applications of quantitative methods in the practice of educational research. The course will reinforce and build upon concepts and skills acquired in EDRS 620. Students will learn through a combination of reading assignments, 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 (i.e., journal articles), to analyze data using the Statistical Package for Social Sciences (SPSS) and the R programming language, and to provide written report of methodology and results.

Course Delivery Method

The class sessions will include lecture, small group discussion, and discussion of SPSS and R outputs. Questions are encouraged. The lab portion of the class will provide time for hands-on computer work that is directly related to the homework and course goals.

Learner Outcomes or Objectives

This course is designed to enable students to do the following:

- (1) Understand the logic of hypothesis testing, type 1 and 2 error, and statistical power;
- (2) Demonstrate a conceptual understanding of the following statistical techniques: one-way, two-way, and three-way ANOVA, part and partial correlation, ANCOVA, and simple and multiple regression;
- (3) Demonstrate via linear equation and explain each of the techniques listed above in terms of the general linear model;
- (4) Select and justify an appropriate test statistic for a particular hypothesis;
- (5) Explain and examine underlying assumptions of each analysis as well as make recommendations for analysis if the assumptions are not upheld;
- (6) Develop SPSS computer skills necessary for conducting statistical analyses;
- (7) Write-up reports of statistical analyses using correct APA format;
- (8) Read, understand, and interpret results of all analyses covered in the course.

Professional Standards

Not Applicable

Required Texts

(1) Hahs-Vaughn, D., Lomax, R. (2020). *An Introduction to Statistical Concepts* (4th ed.). New York: Routledge, <https://doi-org.mutex.gmu.edu/10.4324/9781315624358>

(2) Access to SPSS software. There are computer labs on campus that provide access to SPSS. You can access SPSS software through GMU's virtual computer library at <https://its.gmu.edu/service/citrix-virtual-lab/>. It is the student's responsibility to ensure access to SPSS outside of class time as there will not be sufficient time in class to complete required assignments.

(3) A simple nonprogrammable calculator that has a square root function.

Course Performance Evaluation

Students are expected to submit all assignments on time in the manner outlined by the instructor (e.g., Blackboard, Tk20, hard copy).

- **Assignments and/or Examinations**

- **Online Quizzes (10%)**: There will be a short quiz posted on Blackboard after the meetings. The quizzes are composed of short answer and multiple-choice items which will cover the basic concepts presented in class and in the textbook. These quizzes are designed to provide you (and me) with feedback about your course progress. Your quiz score cannot lower your overall course grade (unless you have received 0's on quizzes due to failure to complete them). You must complete the online quiz by **Sundays at midnight**.

- **Homework Assignments (20%):** You will have 6 homework assignments. Assignments will be posted on Mondays. All assignments need to be completed by **Sundays at midnight**. No late assignments will be accepted. Some questions will ask you to explain statistical concepts, some will ask you to work out problems, and others will require you to run analyses using SPSS/R and interpret results. You should show all of your work for any problem that you complete and include appropriate computer printouts (please cut and paste from SPSS/R to Word). You may work together on your assignments; however, students should submit their own independent write-up of results.
- **Exams (50%):** The two exams will cover the material from the class and textbook and include multiple choice and short answer questions as well as interpretation of SPSS/R output. The midterm exam is worth 25% and the final exam is worth 25%.
- **Understanding Research Article Methods/Analysis (10% each -- 20%total):** Students will complete two article summaries with a particular emphasis on the research questions, methods, analysis, and results. For the first article summary, students will respond to a series of questions using an article that has been selected by the instructor. For the second article summary, each student may select from options provided by the instructor or identify an empirical journal in the student's area of interest that includes the required statistical tests. Students will read the entire article, identify key components of the methods/analysis and write a short commentary/critique (3 pages maximum) of the Methods & Analysis section. Helpful hint: Pay attention to the methods and analyses sections of articles from other courses or research projects. These are great candidates for this course requirement.
- **Other Requirements**
 - **Participation:** Students are encouraged to ask their own questions or reply back to the instructor's comments, or share their thoughts on other students' questions on BB Discussion Board at least once every week.
- **Grading**
 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%		

Professional Dispositions

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

Class Schedule

Date	Class	Topic	Reading/Due
1/24	1	Review of <ul style="list-style-type: none"> ▪ Scale of measurement ▪ Frequency distribution ▪ Central tendency ▪ Introduction to SPSS 	<ul style="list-style-type: none"> ▪ Ch. 1 (1.3-1.5) ▪ Ch. 2 (2.1-2.5) ▪ Ch. 3 (3.2-3.4) ▪ Quiz (class 1 review) posted
1/31	2	Review of <ul style="list-style-type: none"> ▪ Variability ▪ Graphical representation ▪ Introduction to R 	<ul style="list-style-type: none"> ▪ Ch. 2 (2.1-2.5) ▪ Ch. 3 (3.2-3.4) ▪ Quiz (class 2 review) posted
2/7	3	<ul style="list-style-type: none"> ▪ Normal distribution ▪ Standard scores ▪ Standard error 	<ul style="list-style-type: none"> ▪ Ch. 4 (4.1-4.3) ▪ Ch. 5 (5.2) ▪ Quiz (class 3 review) posted ▪ Homework 1 posted
2/14	4	<ul style="list-style-type: none"> ▪ Hypothesis testing ▪ Power, effect size, confidence intervals 	<ul style="list-style-type: none"> ▪ Ch. 6 (all of 6) ▪ Quiz (class 4 review) posted
2/21	5	<ul style="list-style-type: none"> ▪ T-tests (independent and dependent) 	<ul style="list-style-type: none"> ▪ Ch. 7 (all of 7) ▪ Quiz (class 5 review) posted ▪ Homework 2 posted
2/28	6	<ul style="list-style-type: none"> ▪ Chi-square tests 	<ul style="list-style-type: none"> ▪ Ch. 8 (8.2-8.3) ▪ Quiz (class 6 review) posted ▪ Article summary 1 posted (Due: 4/4)
3/7	7	<ul style="list-style-type: none"> ▪ Review & midterm prep 	<ul style="list-style-type: none"> ▪ Homework 3 posted
3/14		<i>Spring Recess</i>	
3/21	8	Midterm Exam	
3/28	9	<ul style="list-style-type: none"> ▪ One-factor ANOVA 	<ul style="list-style-type: none"> ▪ Ch. 11 (11.1, 11.4-11.5) ▪ Ch. 12 (12.1-12.2, 12.4) ▪ Quiz (class 9 review) posted
4/4	10	<ul style="list-style-type: none"> ▪ Factorial ANOVA 	<ul style="list-style-type: none"> ▪ Ch. 13 (13.1, 13.4, 13.6) ▪ Quiz (class 10 review) posted ▪ Homework 4 posted
4/11	11	<ul style="list-style-type: none"> ▪ Correlation and Regression 	<ul style="list-style-type: none"> ▪ Ch. 10 (10.1-10.5) ▪ Ch. 17 (17.1-17.3, 17.5, 17.7) ▪ Quiz (class 11 review) posted
4/18	12	<ul style="list-style-type: none"> ▪ Multiple Regression 	<ul style="list-style-type: none"> ▪ Ch. 18 (18.1-18.3, 18.5, 18.7) ▪ Quiz (class 12 review) posted ▪ Homework 5 posted ▪ Article summary 2 posted (Due: 5/4)
4/25	13	<ul style="list-style-type: none"> ▪ ANCOVA ▪ Repeated measures 	<ul style="list-style-type: none"> ▪ Ch. 14 (14.1-14.2, 14.4, 14.6) ▪ Ch. 15 (15.4, 15.6, 15.10) ▪ Quiz (class 13 review) posted ▪ Homework 6 posted
5/2	14	<ul style="list-style-type: none"> ▪ Review & final exam prep 	
5/9		<i>Reading Day</i>	
5/16	15	Final Exam	

Note: Faculty reserves the right to alter the schedule as necessary, with notification to students.

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/>.

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 <https://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 VIA should be directed to viahelp@gmu.edu or <https://cehd.gmu.edu/aero/assessments>. 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>

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

As a faculty member, I am designated as a “Non-Confidential Employee,” and must report all disclosures of sexual assault, sexual harassment, 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 or support measures 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/>.

SAFE RETURN TO CAMPUS GUIDANCE FOR STUDENTS ENROLLED IN CEHD COURSES

Both a Safe Return to Campus and Successful Learning Opportunities Depend on YOU.

- All students are required to take the Safe Return to Campus Training prior to visiting campus: it is, however, recommended for all Mason students, even those who are enrolled in fully online classes. Training is available in Blackboard.
- Students are required to follow the university's public health and safety precautions and procedures outlined on the university Safe Return to Campus webpage: <https://www.gmu.edu/safe-return-campus>
- All students are required to be fully vaccinated by January 5, 2022, unless they received an approved exemption. You should also have uploaded your vaccine documentation to the Health Services Patient Portal by January 5. The deadline to receive a booster and upload your documentation is February 15, 2022.
- Everyone, even those who are fully vaccinated, must wear a face covering when inside university property (buildings and vehicles). If you're unvaccinated, you must wear a mask outside, as well, when at an event or if physical distancing can't be maintained. Read the full face covering policy here: <https://www.gmu.edu/safe-return-campus/personal-and-public-health/face-coverings>
- All students in face-to-face and hybrid courses must also complete the Mason COVID Health Check daily, seven days a week. You may not come to class if you receive a Yellow, Red, or Blue email response to the Mason COVID Health Check. You may only come to class if you receive a Green email response to the Mason COVID Health Check. You must quarantine and get tested if you receive a Blue email response, because you indicated that you recently traveled outside of the United States, are not fully vaccinated, or have not completed the required 7 to 10 day quarantine period for international travel. If you suspect that you are sick or have been directed to self-isolate, quarantine, or get testing do not go to class. Faculty are allowed to ask you to show them that you have received a Green email and are thereby permitted to be in class.

- Disability Services: Students unable to participate in a course in the manner presented, either due to existing disability or COVID comorbidity risk, should seek accommodations through the Office of Disability Services: <https://ds.gmu.edu/response-to-covid-19/>
- Students may not, either individually or collectively, request permission to change the modality of a current course section due to COVID risks or concerns. If students are not comfortable with the modality of the course for which they are registered, they will need to register for a course offered in a different modality which better will accommodate their needs through the established drop/add process.
- Campus Closure: If the campus closes or class is canceled due to weather or other concerns, students should check Blackboard, Mason email, or the Mason website for updates on how to continue learning and information about any changes to events or assignments
- Participation and Make-up Work: CEHD instructors will work with students to find reasonable opportunities to make up class work or assignments missed due to documented illness. Begin by contacting your instructor for guidance. For further assistance, students may contact their program and the CEHD Office of Student and Academic Affairs (cehdsaa@gmu.edu).
- Technology Requirements:
 - Activities and assignments in CEHD courses regularly use the Blackboard learning system. Students are required to have regular, reliable access to a computer with an updated operating system (recommended: Windows 10 or Mac OSX 10.13 or higher) and a stable broadband Internet connection (e.g., cable modem, DSL, satellite broadband) with a consistent 1.5 Mbps [megabits per second] download speed or higher.
 - Additionally, CEHD course activities and assignments may regularly use webconferencing software (e.g., Blackboard Collaborate or Zoom). In addition to the requirements above, students are required to have a device with a functional webcam and microphone. In an emergency, students can connect through a telephone call, but video connection is the expected norm.
- Course Materials and Student Privacy:
 - All course materials posted to Blackboard or other course site are private; by federal law, any materials that identify specific students (via their name, voice, or image) must not be shared with anyone not enrolled in this class.
 - Video recordings of class meetings that include audio or visual information from other students are private and must not be shared.
 - Live Video Conference Meetings (e.g. Collaborate or Zoom) that include audio or visual information from other students must be viewed privately and not shared with others in your household.
 - Some/All of your CEHD synchronous class meetings may be recorded by your instructor to provide necessary information for students in this class. Recordings will be stored on Blackboard [or another secure site] and will only be accessible to students taking this course during this semester.

- Testing with LockDown Browser: CEHD courses may require the use of LockDown Browser and a webcam for online exams. The webcam can be built into your computer (internal webcam) or can be the type of webcam that plugs in with a USB cable (external webcam). Information on installing and using LockDown Browser may be found here. <https://its.gmu.edu/knowledge-base/how-to-install-and-use-the-respondus-lockdown-browser/>
- You will need the following system requirements for online exams:
 - Windows: 10, 8, 7
 - Mac: OS X 10.10 or higher
 - iOS: 10.0+ (iPad only)
 - Must have a compatible LMS integration
 - Web camera (internal or external) & microphone
 - A reliable internet connection
 - Prior to your first exam, you must install LockDown Browser following the step-by-step instructions linked above.
- To ensure LockDown Browser and the webcam are set up properly, do the following:
 - Start LockDown Browser, log into Blackboard and select your course.
 - Locate and select the Help Center button on the LockDown Browser toolbar.
 - Run the Webcam Check and, if necessary, resolve any issues or permissions your computer prompts.
 - Run the System & Network Check. If a problem is indicated, see if a solution is provided in the Knowledge Base. Further troubleshooting is available through the ITS Support Center.
 - Exit the Help Center and locate the practice quiz.
 - Upon completing and submitting the practice quiz, exit LockDown Browser.
- When taking an online exam that requires LockDown Browser and a webcam, remember the following guidelines:
 - Ensure you're in a location where you won't be interrupted.
 - Turn off all other devices (e.g. tablets, phones, second computers) and place them outside of your reach.
 - Clear your desk of all external materials not permitted — books, papers, phones, other devices.
 - Before starting the test, know how much time is available for it, and that you've allotted sufficient time to complete it.
 - Remain at your computer for the duration of the test. Make sure that your computer is plugged into a power source, or that battery is fully-charged.
 - If the computer or networking environment is different than what was used previously with the Webcam Check and System & Network Check in LockDown Browser, run the checks again prior to starting the test.
- To produce a good webcam video, do the following:
 - Do not wear a baseball cap or hat with a brim that obscures your face.

- Ensure your computer or tablet is on a firm surface (a desk or table). Do NOT have the computer on your lap, a bed, or any other surface where the device (or you) are likely to move.
- If using a built-in (internal) webcam, avoid tilting the screen after the webcam setup is complete.
- Take the exam in a well-lit room and avoid backlighting, such as sitting with your back to a window.
- Remember that LockDown Browser will prevent you from accessing other websites or applications; you will be unable to exit the test until all questions are completed and submitted.