

George Mason University
College of Education and Human Development
Research Methods

EDRS 220-002: Introduction to Applied Quantitative Analysis in the Social Sciences
3 Credits Fall 2024
TR / 10:30 – 11:45 am / Thompson Hall, Room L014, Fairfax Campus

Faculty

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Prerequisites/Corequisites

NONE

University Catalog Course Description

Develops fundamental concepts and methods of statistics in social science settings. Explores applications of descriptive and inferential statistics including hypothesis testing and basic correlational and comparative methods.

Mason Core

EDRS 220 fulfills the Mason Core Quantitative Reasoning requirement. For more information, please see the Mason Core website, <https://catalog.gmu.edu/mason-core/>

Course Overview

EDRS 220 is an undergraduate quantitative analysis course that facilitates student understanding of the basic concepts and principles of descriptive and inferential statistics through the use of social science applications. It emphasizes comprehension, skill development and application of statistical knowledge to quantitative inquiry in education, exercise science, and other social sciences. Students learn through a combination of text reading assignments, data analysis, and interpretation of R (statistical environment) printouts with a *focus on application activities*.

Course Delivery Method

The class sessions will include lecture, small group discussion, and analysis of statistical output. **Questions are encouraged.** The activity portion of the class will provide time for hands-on and computer work that is directly related to the homework and course goals.

Learning Outcomes

This course is a one-semester introduction to applications of statistical analysis. By the end of the semester, it is expected that you will be able to:

- (1) Understand basic concepts and terminology pertinent to statistical analyses;
- (2) Formulate a problem quantitatively [Mason Core Objective #2];
- (3) Identify the type of statistic appropriate for a given research problem;

- (4) Solve a problem with appropriate arithmetical, algebraic, and/or statistical method [Mason Core Objective #2];
- (5) Interpret quantitative information (i.e., formulas, graphs, tables, figures) [Mason Core Objective #1];
- (6) Draw inferences from quantitative information (i.e., formulas, graphs, statistical output) [Mason Core objective #1];
- (7) Evaluate logical arguments using quantitative reasoning [Mason Core Objective #3];
- (8) Communicate and present quantitative findings clearly and effectively [Mason Core Objective #4].

Professional Standards

Not Applicable

Required Texts

Salkind N. J. & Shaw. L A. (2020). *Statistics for people who (think they) hate statistics using R*. Sage.

Access to R software. R is free and open source. R can be installed on almost any computer with any operating system (e.g., Windows, Mac, Linus). There are also computer labs on campus that provide access to R. [You will get information about how to access and download R in class.]

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.

- **Online Quizzes (10%):** Each week 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. 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 midnight the day before the first class meeting of the next topic. *You are encouraged to take the quizzes soon after the class meeting; the purpose of the quiz is to help you to isolate key concepts from the class period and to focus your study time.*
- **Application Assignments (35%):** You will have five homework assignments. Assignments will be posted on Blackboard. Each assignment will include a scenario and accompanying data necessary to complete the problem set. These assignments are like mini projects. All assignments need to be completed by the due date. **Late submission will incur a penalty of 10 points unless a valid reason is provided in advance.** Scenarios will require you to explain statistical concepts, work out problems, run analyses using R and interpret results. You should show all of your work for problems that you complete and include appropriate computer printouts (**please copy and paste output from R to a Word document**). There is a targeted written or oral explanation of the results required in each of these assignments. Three of the assignments will be written (i.e., typed) documents and two will be oral video presentations with ppt slides.

- **“In Class” Activities & Participation (15%):** Students will complete in-class problem solving activities in small groups. Each activity will require data analyses and a lab write-up or questionnaire submitted at the completion of the tasks. Some activities will include explanation and presentation of findings to the class.
- **Exams (40%):** Three exams will cover the material from the class and textbook and include multiple choice and short answer application questions as well as interpretation of statistical output. **The first two exams are worth 10% each and the final, cumulative exam is worth 20%.**

Grading Scale: Grades will be assigned based on the following:

A+	98-100%	B+	88-89%	C+	78-79%	D	60-69%
A	93-100%	B	83-87%	C	73-77%	F	Below 60%
A-	90-92%	B-	80-82%	C-	70-72%		

Final grades are based in the assessments described above. **“Extra credit” is not available.**

Late Assignments: *As a general rule, late assignment 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).

Use of Generative AI

Use of Generative AI tools should be used following the fundamental principles of Mason’s Academic Standards. This includes being honest about the use of these tools for submitted work and including citations when using the work of others, whether individual people or Generative AI tools.

Professional Dispositions (CEHD Student Guide)

Throughout study in the College of Education and Human Development, students are expected to demonstrate behaviors that reflect the positive dispositions of a professional. See <https://cehd.gmu.edu/current-students/cehd-student-guide>.

Tentative Course Schedule

Week	Date	Topic	Reading	Due
1	T 8/27	Intro to Statistics & Frequency Distributions	Chs. 1-3 Appendix A	<ul style="list-style-type: none"> • Quiz – Topic 1 (Due: 8/28)
	R 8/29	Learning about R		<ul style="list-style-type: none"> ○ Class Activity Submission (CAS) 1 (Due: 9/2)
2	T 9/3	Central Tendency and Variability (1)	Ch. 4	<ul style="list-style-type: none"> • Quiz – Topic 2 (Due: 9/4)
	R 9/5	Central Tendency and Variability (2) <i>Last Day to Drop with 100% Tuition Refund (Sep 9)</i>	Ch. 5	<ul style="list-style-type: none"> ○ CAS 2 (Due: 9/9) ❖ HW #1 (Due: 9/21)
3	T 9/10	Using descriptives and graphs	Ch. 6	
	R 9/12	Correlation	Ch. 7	<ul style="list-style-type: none"> • Quiz – Topic 3 (Due: 9/16) ○ CAS 3 (Due: 9/18)
4	T 9/17	Validity and Reliability	Ch. 8	
	R 9/19	Hypothesis testing	Ch. 9	<ul style="list-style-type: none"> • Quiz – Topic 4 ○ CAS 4 (Due: 9/23)
5	T 9/24	Review for Exam #1		
	R 9/26	Exam #1		
6	T 10/1	Probability and Z score	Ch. 10	<ul style="list-style-type: none"> ○ CAS 5 (1) (Due: 10/2)
	R 10/3	Statistical significance	Ch. 11	<ul style="list-style-type: none"> • Quiz – Topic 5 ○ CAS 5 (2) (Due: 10/7)
7	T 10/8	Z-tests and Distribution of sample means (1)	Ch. 12	<ul style="list-style-type: none"> ○ CAS 6 (1) (Due: 10/14)
	R 10/10	Z-tests and Distribution of sample means (2)		<ul style="list-style-type: none"> • Quiz – Topic 6 ○ CAS 6 (2) (Due: 10/14) ❖ HW #2 (Due: 10/16)
8	T 10/15	The t distribution independent t-tests (1)	Ch. 13	
	R 10/17	The t distribution independent t-tests (2)		<ul style="list-style-type: none"> ○ CAS 7 (1) (Due: 10/23)

9	T 10/22	Dependent t-tests	Ch. 14	<ul style="list-style-type: none"> • Quiz – Topic 7 ○ CAS 7 (2) (Due: 10/23) <p>❖ HW #3 (Due: 10/26)</p>
	R 10/24	Review for Exam #2		
10	T 10/29	Exam #2		
	R 10/31	One-way ANOVA (1)	Ch. 15	
11	T 11/5	Election Day (No Class)		
	R 11/7	One-way ANOVA (2)		<ul style="list-style-type: none"> • Quiz – Topic 8 ○ CAS 8 (Due: 11/13) <p>❖ HW #4 (Due: 11/18)</p>
12	T 11/12	Chi-square tests – GOF	Ch. 19	<ul style="list-style-type: none"> • Quiz – Topic 9.1 ○ CAS 9.1 (Due: 11/20)
	R 11/14	Chi-square tests – TOI		<ul style="list-style-type: none"> • Quiz – Topic 9.2 ○ CAS 9.2 (Due: 11/25)
13	T 11/19	Correlation and simple regression (1)	Chs. 17-18	
	R 11/21	Correlation and simple regression (2)		
14	T 11/26	Multiple Regression		<ul style="list-style-type: none"> • Quiz – Topic 10 ○ CAS 10 (Due: 12/2) <p>❖ HW 5 (Due: 12/4)</p>
	R 11/28	Thanksgiving Recess (No Class)		
15	T 12/3	Choosing the right test		
	R 12/5	Review for Final Exam		
16	T 12/10	Reading Day (No Class)		
	R 12/12	Final Exam 10:30am – 1:10pm		

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

CEHD Commitments

The College of Education and Human Development is committed to fostering collaboration and community, promoting justice and equity, and advancing research-informed practice. Students are expected to adhere to, and contribute to, these commitments, the CEHD Mission, and Core Values of George Mason University. More information can be found here:

<https://cehd.gmu.edu/about/culture/>

GMU Policies and Resources for Students

Policies

- Students must adhere to Mason's Academic Standards (see <https://catalog.gmu.edu/policies/academic-standards/>)
- 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 your LMS should be directed to:
 - Blackboard Learn: <https://its.gmu.edu/knowledge-base/blackboard-instructional-technology-support-for-students/>
 - Canvas: <https://its.gmu.edu/service/canvas/>
- For information on student support resources on campus, see:
 - TimelyCare: <https://caps.gmu.edu/timelycare-services/>
 - Writing Center: <https://writingcenter.gmu.edu/>
- For additional information on the College of Education and Human Development's Student Success Resources, please visit: <https://cehd.gmu.edu/students/>.

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/>