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 Summer 2024
T/ 1:30 – 3:15 pm / Thompson Hall L014, Fairfax Campus
R/ 1:30 – 3:15 pm / Online

Faculty
Name: Zikun Li
Office Hours: Tuesdays after class, or by appt.
Email Address: zli35@gmu.edu
Zoom: Link can be found on the Blackboard

Prerequisite:
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 though 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*.

Learner Objectives: 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].

Course Delivery Method: *This is a hybrid course*. One weekly in-person meeting will occur on Tuesdays in Thompson L014, and the other will occur online on Thursdays, either synchronously or asynchronously. 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.

Class Attendance & Participation: Students are expected to come to class on time, complete assignments, and participate in class activities. Information on course assignments, weekly quizzes, and notes for class lectures are available on the course Blackboard site.
For assistance with Blackboard students may email courses@gmu.edu, call (803) 993-3141, or go to Johnson Center Rm 311 (office hours: 8:30 am-5 pm). For general technical assistance, students may call 9703) 993-8870 or go to the counter in Innovation Hall.

Required Materials:
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:

- **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%. **All exams will be administered in person.**

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).

Professional Dispositions

See https://cehd.gmu.edu/students/polices-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/.

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 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/ .

Week	Date	Topic	Reading	Due
1	T 5/14 In person	*Lecture* 1. Intro to Statistics & Frequency Distributions 2. Central Tendency and Variability (1) Download and install R and RStudio on your computer/laptop (details can be found in Bb)	Chs. 1-5 Appendix A	• Quiz – Topic 1 & 2 • Class Activity Submission (CAS) 1& 2 *Due: 5/19*
	R 5/16 Online	*Lecture* 1. Central Tendency and Variability (2) *Activity* 1. Learning about R 2. Central Tendency and Variability		
2	T 5/21 In-person	*Lecture* 1. Using descriptives and graphs 2. Correlation 3. Validity and Reliability	Chs. 6-9	• Quiz – Topic 3 & 4 • CAS 3 & 4 *Due: 5/26* • **HW1 (*Due: 5/28*)**
	R 5/23 Online	*Lecture* 1. Hypothesis testing *Activity* 1. Using descriptives and graphs 2. Correlation 3. Hypothesis testing		
3	T 5/28 In-person	Exam 1 Review Last Day to Drop with 100% Tuition Refund		
	R 5/30 **In-person**	**Exam 1**		

4	T 6/4 In-person	*Lecture* 1. Probability and Z score 2. Statistical significance 3. Z-test and Distribution of Sample Means (1)	Chs. 10-12	• Quiz – Topic 5&6 • CAS 5&6 ***Due: 6/9***
	R 6/6 Online	*Lecture* 1. Z-test and Distribution of Sample Means (2) *Activity* 1. Probability and Z score 2. Statistical significance 3. Z-test and Distribution of Sample Means		
5	T 6/11 In-person	*Lecture* 1. T-distribution 2. Independent T-tests	Ch. 13	• CAS 7(1) • **HW2** ***Due: 6/16***
	R 6/13 Online	*Activity* 1. Independent T-tests		
6	T 6/18 In-person	*Lecture & Activity* 1. Dependent T-tests	Ch. 14	• Quiz – Topic 7 • CAS 7 (2) ***Due: 6/23*** • **HW3 (*Due: 6/25*)**
	R 6/20 Online, **Asynchronous**	*Individual Troubleshoot* 1. CAS 5-7 2. HW 2&3 3. Any other topic-related questions		
7	T 6/25	Exam 2 Review		

	In-person			
	R 6/27 **In-person**	**Exam 2**		
8	T 7/2 In-person	*Lecture* 1. One-Way ANOVA	Ch. 15	• Quiz – Topic 8 • CAS 8 *Due: 7/7* • **HW4 (*Due: 7/9*)**
	R 7/4 Online, **Asynchronous**	*Video* 1. One-Way ANOVA using R Independence Day (UNIVERSITY CLOSED)		
9	T 7/9 In-person	*Lecture* 1. Chi-square tests – GOF 2. Chi-square tests - TOI	Ch. 19	• Quiz – Topic 9 • CAS 9 *Due: 7/14*
	R 7/11 Online	*Activity* 1. Chi-square tests – GOF 2. Chi-square tests - TOI		
10	T 7/16 In-person	*Lecture* 1. Simple Regression 2. Multiple Regression	Chs. 17-18	• Quiz – Topic 10 • CAS 10 *Due: 7/21*
	R 7/18	*Activity* 1. Simple Regression		

		2. Multiple Regression		
	Online			
11	T 7/23 In-person	*Lecture & Activity* 1. Choosing the Right Test		• **HW 5** *Due: 7/28*
	R 7/25 Online, **Asynchronous**	*Individual Troubleshoot* 1. CAS 8-10 2. HW 4&5 3. Any other topic-related questions		
12	T 7/30 In-person	Final Exam Review		
	R 8/1 **In-person**	**Final Exam**		