GEORGE MASON UNIVERSITY
COLLEGE OF EDUCATION AND HUMAN DEVELOPMENT

EDRS 811 (001)
Quantitative Methods in Educational Research
Spring 2016, Mondays 4:30pm – 7:10pm
Innovation Hall Room 317

PROFESSOR

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COURSE DESCRIPTION

Catalog 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.

Expanded Course Description: 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 to provide written reports of methodology and results.

Prerequisite: Successful completion of EDRS 620 (or its equivalent) and EDUC 810 (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).*

LEARNING OUTCOMES

This course is a one-semester statistics course design to expand students' understanding of ANOVA techniques and an introduction to regression analyses. By the end of the semester, it is expected that you will be able to:

a) Understand the logic of hypothesis testing, type 1 and 2 error, and statistical power;
b) 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;
c) Demonstrate via linear equation and explain each of the techniques listed above in terms of the general linear model;
d) Select and justify an appropriate test statistic for a particular hypothesis;
e) Explain and examine underlying assumptions of each analysis as well as make recommendations for analysis if the assumptions are not upheld;
f) Develop SPSS computer skills necessary for conducting statistical analyses;
g) Write-up reports of statistical analyses using correct APA format;
h) Read, understand, and interpret results of all analyses covered in the course.

NATURE OF COURSE DELIVERY

This course will be taught using lectures, discussions, and group activities in a computer classroom. *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.

The course is technology-enhanced using Blackboard (http://mymasonportal.gmu.edu). Information on course assignments, weekly quizzes, and notes for class lectures are available on the course Blackboard site. Students are expected to have a MESA account (go to http://password.gmu.edu to set an account) and are responsible for any information posted on the Blackboard site.

For assistance with Blackboard students may email courses@gmu.edu, call (703) 993-3141, or go to Johnson Center Rm 311 (office hours: 8:30am-5pm). For general technical assistance, students may call (703) 993-8870 or go to the counter in Innovation Hall.

REQUIRED MATERIALS

1) Lomax, R. G. & Hahs-Vaughn, D. L. (2012) *An Introduction to Statistical Concepts,* 3rd Ed. New York: Routledge. ISBN: 978-1-415-88005-3

2) Access to SPSS software. Students are *not* required to purchase statistical software for this course. However, assignments will require the use of SPSS. This program is available for use in the computer labs on campus. Students can access SPSS software through GMU's virtual computer library at www.vcl.gmu.edu. Information about how to use the virtual computer library is available at http://itservices.gmu.edu/services/view-service.cfm?customel_dataPageID_4609=5689.
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.

RECOMMENDED TEXT

American Psychological Association. (2010). *Publication manual of the American Psychological Association* (6th ed.). Washington, DC: Author.

COURSE REQUIREMENTS

It is expected that student will:

1) Read all assigned materials before coming to class.
2) Participate in classroom activities that reflect critical reading of materials.
3) Complete in-class and homework assignments, quizzes, and article critiques.
4) Complete an in-class midterm and final examination.
5) Come to each class session on time.

HOW TO SUCCEED IN EDRS 811

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.

Statistics Study Tips:

1. Read widely; then read some more.
2. 'Google' difficult concepts. There is lots of helpful statistical information on the web.
3. Check for understanding frequently. This means that when a formula is presented, take time to see if you can explain how the formula works. If Greek letters are difficult for you, write out what each letter means.
4. Complete as many questions/problems as possible at the end of the chapters.
5. Develop examples of research questions and hypotheses that are appropriate for each statistical technique.
6. Form a study group.
7. Start the homework as soon as possible after class; waiting until the night before it is due does not help you process the material.

COURSE ASSIGNMENTS AND EVALUATION

1. Online Quizzes (10%)

Each week (beginning Week 2) 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 without any books or notes. These quizzes are designed to provide students (and the instructor) with feedback about course progress. The two lowest quiz grades will be dropped. Quiz grades cannot lower students' overall course grade (unless they received 0's on quizzes due to failure to complete them). Students must complete the online quiz by midnight the day before class meets. Students are encouraged to take the quizzes soon after the class meeting; the purpose of the quiz is to help isolate key concepts from the class period and to focus study time.

2. Homework Assignments (20%)

Students will complete homework assignments throughout the semester. All assignments will be posted on Blackboard and are due at the beginning of the class on the due date. These assignments are meant to apply and practice the course material.

For homework assignments, handwritten work is acceptable but should be neat and readable. Questions will ask students to explain statistical concepts, work out problems, and or run analyses using SPSS and interpret results. Students should show all of the work for any problem completed. When referring to computer printouts cut and paste the appropriate SPSS output into the homework assignment. Be sure to label and explain clearly. Students may consult with each other for these assignments but each student is to submit an independent write up of results. Students should retain a copy of all submitted homework assignments.

3. Understanding Research Article Methods/Analysis: Article Summaries/Critiques (15% total)
Students will complete three 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 two article summaries, students will select one empirical journal article that reports on the results of a quantitative research project that is related to their research interests for *each of 2 categories of methods of analysis* covered this semester (total of 2 selected articles):

(a) ANOVA (one-way, repeated, factorial, or ANCOVA), and
(b) Multiple Regression

Students are to read the entire article, identify key components of the methods/analysis, write a short commentary/critique (*3 page maximum*) of the Methods & Analysis section, and submit the summary/critique and a pdf of the article. 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.*

4. Midterm and Final Examination (25% Midterm; 30% Final Exam—55% total)
The two exams, as indicated in the course schedule, will be given assessing material from the class and textbook (e.g., conceptual questions, application of skills, interpretation of SPSS output) using multiple choice, matching, and short answer questions.

Grading Policy
Your final grade for this class will be based on the following:

A+ = 98 – 100%	A = 93 – 97.99%	A- = 90 – 92.99%
B+ = 88 – 89.99%	B = 83 – 87.99%	B- = 80 – 82.99%
C = 70 – 79.99%	F < 70%	

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

TK20 Performance-Based Assessment submission Requirement: Not Applicable

COLLEGE OF EDUCATION AND HUMAN DEVELOPMENT STATEMENT OF EXPECTATIONS:

Student Expectations:

- ***Honor Code:*** Students must adhere to the guidelines of the George Mason University Honor Code [See http://oai.gmu.edu/the-mason-honor-code/].
    - Students must not give or receive unauthorized assistance.
    - Plagiarism is also a violation of the honor code. Please note that:
        - "Plagiarism encompasses the following:
            1. Presenting as one's own the words, the work, or the opinions of someone else without proper acknowledgment.
            2. Borrowing the sequence of ideas, the arrangement of material, or the pattern of thought of someone else without proper acknowledgment."

            (from Mason Honor Code online at http://mason.gmu.edu/~montecin/plagiarism.htm)
        - Paraphrasing involves taking someone else's ideas and putting them in your own words. When you paraphrase, you need to cite the source.
        - When material is copied word for word from a source, it is a direct quotation. You must use quotation marks (or block indent the text) and cite the source.
        - Electronic tools (e.g., SafeAssign) may be used to detect plagiarism if necessary.
        - Plagiarism and other forms of academic misconduct are treated seriously and may result in disciplinary actions.

- ***Responsible Use of Computing:*** Students must follow the university policy for Responsible Use of Computing [See http://universitypolicy.gmu.edu/policies/responsible-use-of-computing/
- ***Disability Services and Accommodations:*** Students with disabilities who seek accommodations in a course must be registered with the George Mason University Office of Disability Services (ODS) and inform their instructor, in writing, at the beginning of the semester [See http://ods.gmu.edu/].
- ***Email Communication:*** Students are responsible for the content of university communications sent to their George Mason University 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.
- ***Sound Emitting Devices:*** Students must follow the university policy stating that all sound emitting devices shall be turned off during class unless otherwise authorized by the instructor.
- ***Professional Dispositions:*** Students are expected to exhibit professional behaviors and dispositions at all times.
- ***Core Values Commitment:*** The College of Education & 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/

Campus Resources:

- The George Mason University Counseling and Psychological Services (CAPS) staff consists of professional counseling and clinical psychologists, social workers, and counselors who offer a wide range of services (e.g., individual and group counseling, workshops and outreach programs) to enhance students' personal experience and academic performance [See http://caps.gmu.edu/].
- The George Mason University Writing Center staff provides a variety of resources and services (e.g., tutoring, workshops, writing guides, handbooks) intended to support students as they work to construct and share knowledge through writing [See http://writingcenter.gmu.edu/].
- For additional information on the College of Education and Human Development, Graduate School of Education, please visit our website [See http://gse.gmu.edu/]

ADDITONAL CLASS POLICIES

Late Assignments
Assignments are due at the start of class on the assigned due date. *As a general rule, late papers/homework 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). If an assignment must be turned in late or outside of class, students may give the assignment to me in person, leave the assignment in my faculty mailbox (West Room 2108), or post the document to Blackboard. If an assignment is left in my mailbox, send an email to indicate that it is there. *DO NOT* slide assignments under my office door.

Electronic Device Use in Class
During class time, please refrain from checking email or conducting activities on the computer, cell phone or other electronic device that are not directly related to the class session.

Class Environment
Help to foster a positive learning environment by respecting the opinions and contributions of others. Also, cell phones should be turned off or put on silent mode so as to not affect the learning of those around you.

TENTATIVE COURSE SCHEDULE

Date	Class	Topic	Assigned Reading	Assignments Due
Mon 1/25	1	Review: Data, Descriptives & Sampling Distributions SPSS	Chs. 1-3	
Mon 2/1	2	Review: Distributions & Standardized Scores; Intro to SPSS	Ch. 4	Quiz 1
Mon 2/8	3	Standard Error, Hypothesis Testing, Power	Chs. 5-6 (thru 6.6.2)	Quiz 2 HW 1 (Descriptives, Distributions, & Standardized Scores)
Mon 2/15	4	Effect Size, Confidence Intervals, T-test (single, independent, dependent)	Chs. 6- 7	Quiz 3
Mon 2/22	5	Chi-square	Ch. 8	Quiz 4 HW 2 (z and t tests)
Mon 2/29	6	Correlation	Ch. 10	Quiz 5 Directed Critique
Mon. 3/7	7	SPRING BREAK		HW 3 (Chi-Square & Correlation) Friday 3/4
Mon 3/14	8	ANOVA Review and Catch Up	Chs. 11-12	Quiz 6
Mon 3/21	9	**MIDTERM EXAMINATION**		Quiz 7
Mon 3/28	10	ANOVA	Chs. 11-12	
Mon 4/4	11	Factorial ANOVA	Ch. 13	Quiz 8
Mon 4/11	12	ANCOVA **AERA**	Ch. 14	Quiz 9 HW 4 (ANOVA & Factorial ANOVA)
Mon 4/18	13	ANCOVA Simple Regression Multiple Regression	Ch. 14 Ch. 17 Ch. 18	Quiz 10 Article Critique #1: (ANOVA/ANCOVA)
Mon 4/25	14	Multiple Regression	Ch. 18	Quiz 11
Mon 5/2	15	Multiple Regression Random & Mixed Factor ANOVA, Repeated Measures	Ch. 18 Ch. 15	Quiz 12 HW 5 (ANCOVA & Regression) Article Critique #2: Regression
Mon 5/9		**FINAL EXAMINATION**		

Notes: Last day to drop, no tuition liability: Jan 26th; Last day to drop, 33% penalty: Feb 2nd; Last day to drop, 67% penalty: Feb. 19th