

**EDRS 620: Quantitative Methods in Educational Research  
Spring 2014**



**Course Time: Monday 4:30-7:10 p.m.**  
**Course Location: Room 013 Thompson Hall**

**Instructor: Layne Kalbfleisch, M.Ed., Ph. D.**  
Office Hours: By appointment  
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**Catalog Course Description**

This course examines fundamental concepts and methods of statistics as applied to educational problems including descriptive and inferential statistics. The course explores hypothesis testing, correlational techniques, t-tests, analysis of variance, post-hoc comparison, factorial designs, regression, and non-parametric statistics.

**Specific Course Description**

EDRS 620 is a graduate quantitative analysis course that facilitates student understanding of the basic concepts, and principles of descriptive and inferential statistics. It emphasizes comprehension, skill development and application of statistical knowledge to quantitative inquiry in education. Students learn through a combination of text reading assignments, data analysis and interpretation of SPSS printouts (Statistical Package for Social Sciences), and application activities. The course lays the foundation for advanced study of quantitative analysis for students desiring to continue their studies in this endeavor.

**Prerequisite: EDRS 590 or equivalent experience**

**Required Materials:**

(1) Gravetter, F. J. and Wallnau, L. B. (2011). Essentials of Statistics for the Behavioral Sciences (8<sup>th</sup> ed.). Belmont, CA: Wadsworth/Thomson Learning. ISBN: 978-1-133-95657-0

(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 [www.vcl.gmu.edu](http://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](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.

**Related Resource:**

American Psychological Association. (2009). Publication manual of the American Psychological Association. 6th Ed. Washington, D. C.: American Psychological Association.

**Course Format:** The class sessions will include lecture, small group discussion, and discussion of SPSS output. **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.

**Class Attendance & Participation:** Students are expected to come to class on time, complete assignments, and participate in class discussions.

**Course goals:** By the end of the semester, it is expected that you will be able to:

- (1) Understand basic concepts, terminology, and assumptions pertinent to statistical analyses;
- (2) Identify the type of statistic appropriate for a given research question;
- (3) Use basic inferential statistics to test hypotheses;
- (3) Interpret statistical findings;
- (4) Compute, by hand and computer, basic statistical analyses;
- (5) Design the basic components of a small-scale quantitative research study;
- (6) Write clearly and coherently about the conceptual framework, research questions and methods used in a study;
- (7) Report statistical results in correct APA format.

**Class Preparation:** 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](mailto: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.

#### **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.

#### **ASSESSMENT:**

- **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. Quizzes are timed (usually 25 minutes) and must be completed during the specified time period. 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 class meets. *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.*

- **Homework Assignments (20%):** You will have 4 homework assignments. Assignments will be posted weekly on Blackboard. Each week’s assignment will include problems that are recommended as well as problems that will be graded. The graded problems will be collected periodically (see tentative schedule). All assignments need to be completed by the beginning of the class on the due date. 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 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 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 output. The midterm exam is worth 25% and the final exam is worth 25%.
- **Quantitative Analysis Project (20%):\*\*:** This course requires students to complete a statistical analysis project for a study in an educational setting. The final project must be handed in on time and adhere to the APA Publications Manual Guidelines. Guidelines will be provided.

**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 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).

\*\*Performance-Based Assessment that must be submitted via TaskSteam

## GMU POLICIES AND RESOURCES FOR STUDENTS

- a. Students must adhere to the guidelines of the George Mason University Honor Code [See <http://oai.gmu.edu/honorcode/>].
- b. Students must follow the university policy for Responsible Use of Computing [See <http://universitypolicy.gmu.edu/1301gen.html>].
- c. 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.
- d. 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/>].
- e. 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/>].
- f. Students must follow the university policy stating that all sound emitting devices shall be turned off during class unless otherwise authorized by the instructor.
- g. 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/>].

## 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/>

## TASKSTREAM REQUIREMENTS

Every student registered for any Educational Psychology course with a required performance-based assessment is required to submit this assessment- **Quantitative Analysis Project**- to TaskStream (regardless of whether a course is an elective, a onetime course or part of an undergraduate minor.) Evaluation of your performance-based assessment will also be provided using TaskStream. Failure to submit the assessment to TaskStream will result in the course instructor reporting the course grade as Incomplete (IN). Unless this grade is changed upon completion of the required TaskStream submission, the IN will convert to an F nine weeks into the following semester.

### Tentative Course Schedule

<b>Date</b>	<b>Class</b>	<b>Topic</b>	<b>Reading/Due</b>
1/27	1	Course Info Intro to Statistics & Frequency Distributions Intro to SPSS	Ch. 1 &2 Appendix A: Basic Math Review
2/3	2	Central Tendency Variability	Ch. 3 & 4
2/10	3	Z-scores: location Standard Distributions	<b>HW #1</b> Ch. 5
2/17	4	Probability	Ch. 6
2/24	5	Distributions of Sample Means	Ch.7
3/3	6	Hypothesis Testing & Power	<b>HW #2</b> Ch. 8
<b>3/10</b>		<b>Spring Break</b>	
3/17	7	<b>Midterm Exam</b>	
3/24	8	The t distribution	Ch. 9
3/31	9	T-tests	Ch. 10 & 11
4/7	10	ANOVA	Ch. 12
4/14	11	Correlation & Simple Regression	<b>HW#3</b> Ch. 14
4/21	12	Chi-Square	Ch. 15
4/28	13	<b>Individual Conferences</b>	<b>HW#4 (due 4/30 by 5 pm)</b>
5/5	14	Extensions: Repeated Measures & Factorial ANOVA (basics only) Review	Ch. 13
			<b>Last day to submit Quantitative Analysis Project Thurs. 5/8 by 5 pm.</b>
5/12		<b>FINAL EXAM</b>	

## Appendix A

### EDRS 620

#### Rubric for Performance Assessment: Quantitative Analysis Project

##### GENERAL EVALUATION CRITERIA:

- *Clarity and organization* • *Comprehensiveness of content* • *APA style*

Performance Elements	Quality Points
<b>Introduction Section</b> <b>max = 9 points</b>	
Statement of the nature and importance of the problem and literature review related to the issues.	<b>4-5 points:</b> The study problem is (a) relevant to the area of educational research, (b) described in a parsimonious and complete manner, (c) channeled towards the purpose of the study, and (d) embedded in a literature review on related theory and research.
	<b>2-3 points:</b> The study problem is relevant to the area of educational research and overall well described, but not channeled towards the purpose of the study or the literature review is not quite on target.
	<b>0-1 points:</b> The study problem is not relevant to the area of educational research and/or not clearly described, poorly channeled towards the purpose of the study, and not supported well by literature review.
Justification of the need for this study	<b>2 points:</b> The justification of the study is well described and stems from a necessity to fill up an existing gap in previous research on the topic or to conduct a replication study.
	<b>0-1 points:</b> The justification of the study is not well described and/or does not stem from a necessity to fill up an existing gap in previous research on the topic or to conduct a replication study.
Statement of the purpose of the study and related research questions.	<b>2 points:</b> The purpose of the study is connected to the statement of the problem and the research questions are properly described.
	<b>0-1 points:</b> The purpose of the study is not well connected to the statement of the problem and/or the research questions are not properly described.
<b>Methods Section</b> <b>max = 13 points</b>	
Description of the study sample	<b>4 points:</b> Provided is clear, accurate, and complete description of the study sample — sampling method (random selection, volunteers, etc.), relevant demographic characteristics, sample size (total and by subgroups), and judgment about sample representativeness for the targeted population.
	<b>2-3 points:</b> Provided is relatively complete description of the study sample, with drawbacks related to the description of sampling method, relevant demographic characteristics, sample size, or sample representativeness.
	<b>0-1 points:</b> Provided is poor description of the study sample, with missing elements related to method of sampling, relevant demographic characteristics, and representativeness.
Description of the data (instruments, scales, and score reliability)	<b>2-3 points:</b> Provided is clear, accurate, and complete description of the data sources (e.g., assessment instruments, existing records, etc.), scoring rubrics, scales, and reliability of scores obtained for the study sample.
	<b>0-1 points:</b> Provided is incomplete (or lacking) description of data sources and there is no report on reliability estimates.
Description of the data collection method	<b>2 points:</b> Provided is clear, accurate, and complete description of the data collection method — e.g., existing students records or online data base.
	<b>0-1 points:</b> Provided is incomplete (or lacking) description of the data collection method.

Description of data analysis methods and procedures used to address the research questions in the project	<b>4 points:</b> Provided is clear, accurate, and complete description of <i>appropriate</i> data analysis methods and procedures used to address the research questions.
	<b>2-3 points:</b> Selected are <i>appropriate</i> methods and procedures of data analysis, with lack of sufficient clarity, accuracy, and/or completeness in description.
	<b>0-1 points:</b> Some (or all) of the selected data methods and procedures are <i>not appropriate</i> for addressing the project research questions.
<b>Results Section max = 14 points</b>	
Within-text presentation of results obtained with the statistical data analysis for each research question	<b>8 points:</b> Provided is clear, accurate, and complete presentation of relevant results in APA style by project research questions.
	<b>6-7 points:</b> Provided is clear, accurate, and complete presentation of relevant results by project research questions, with some deviations from the APA style.
	<b>5-6 points:</b> Presented are relevant results by project research questions, with some deviations from clarity, completeness, and the APA style.
	<b>4-5 points:</b> Presented are relevant results by project research questions, with some deviations from clarity, accuracy, completeness, and the APA style.
	<b>2-3 points:</b> Some results are irrelevant and/or there are problems with clarity, accuracy, completeness, and APA style.
	<b>0-1 points:</b> Some (or all) results are irrelevant and there are serious problems with clarity, accuracy, completeness, and APA style.
Presentation of tables	<b>2-3 points:</b> The tables include all necessary information presented in APA style.
	<b>0-1 points:</b> The tables do not include all necessary information and /or there APA style problems.
Presentation of figures	<b>2-3 points:</b> The figures are clear and provide relevant information in APA style.
	<b>0-1 points:</b> There are some (or serious) problems with clarity of the figures, their relevance, and/or APA style.
<b>Discussion Section max = 14 points</b>	
Conclusions drawn from the results, findings and implications for theory and/or practice	<b>8 points:</b> Provided is clear, accurate, and complete presentation of conclusions drawn from the study results, comparisons with findings in previous studies on the topic of interest, plausible explanations of the study findings, and implications for theory and/or practice.
	<b>6-7 points:</b> Provided is clear, accurate, and complete presentation of conclusions drawn from the study results, with minor problems in accuracy and/or sufficiency related to comparisons with findings in previous studies, plausible
	<b>4-5 points:</b> Some conclusions are not well connected to the study results and there are relatively serious problems in accuracy and/or sufficiency related to comparisons with findings in previous studies, plausible explanations of the study findings, implications for theory and/or practice, and APA style.
	<b>2-3 points:</b> Some conclusions do not stem from the study results and there are serious problems in accuracy and/or sufficiency related to comparisons with findings in previous studies, plausible explanations of the study findings, implications for theory and/or practice, and APA style.
	<b>0-1 points:</b> : The conclusions do not stem from the study results and there are serious problems in accuracy and/or sufficiency related to comparisons with findings in previous studies, plausible explanations of the study findings, implications for theory and/or practice, and APA style.

Limitations of the study	<b>2-3 points:</b> Provided is clear, accurate, and complete presentation of the limitations of the study, with implications for the study findings and their generalization.
	<b>0-1 points:</b> There are serious problems in clarity, accuracy, and completeness of the study limitations and their implications for the findings and their generalization.
Recommendations for future research	<b>2-3 points:</b> The recommendations for future research are clearly presented and stem from logical necessity for meaningful replications (e.g., to validate and/or generalize the findings) and/or further extensions of the study design and analyses
	<b>0-1 points:</b> The recommendations for future research are <i>not</i> clearly presented