George Mason University
Graduate School of Education

COURSE SYLLABUS

EDRS 620 Quantitative Inquiry in Education (3:3:0)
EDRS 620 001

Spring 2012

Instructor:	**Charles L. Thomas, PhD**
Class Day & Time:	**Tuesday, 4:30-7:10 pm**
Location:	**L08 Thompson**
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Office Hours:	**Tue & Thur, 2:30-3:45** **Other Times arranged by appointment**

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. Students identify and report on quantitative methods used in published research (e.g., professional journal articles). 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

STUDENT OUTCOMES
- Students will be able to design the basic components of a small-scale quantitative research study including descriptive statistics and inferential statistics
- Students will be able to write clearly and coherently about the conceptual framework, questions and methods used in a research study
- Students will be able to deal appropriately with ethical issues in research
- Students will be able to develop research hypotheses that relate to research questions
- Students will be able to demonstrate an understanding of quantitative research design through completion of a project

- Students will be able to identify threats to internal and external validity in simulated studies and their own research design
- Students will be able to conduct statistical analysis using SPSS, and interpret SPSS outputs.
- Students will be able to demonstrate an understanding of t-tests, one-way and two-way ANOVA, regression and non-parametric tests
- Students will be able to demonstrate an understanding of power effect size analysis
- Students will be able to evaluate and critique published quantitative research articles
- Students will be able to develop and reinforce their critical thinking, problem solving, oral and writing skills

RELATIONSHIP TO PROGRAM GOALS AND PROFESSIONAL ORGANIZATIONS

The program goals are consistent with areas of expertise associated with the following Learner-centered psychological principles (APA Division 15) outlined by the American Psychological Association Presidential Task Force in Education.

- Principle 1: The Nature of Learning Process
- Principle 2: Goals of the Learning Process
- Principle 3: Construction of Knowledge
- Principle 4: Strategic Thinking
- Principle 5: Thinking about Thinking
- Principle 6: Context of Learning
- Principle 13: Learning and Diversity

Please see:
American Psychological Association (1997). Learner-Centered Psychological Principles*: Guidelines for the Teaching of Educational Psychology in Teacher Education Programs*.
Retrieved October 14, 2002 from http://www.apa.org

NATURE OF COURSE DELIVERY

The course is structured around readings, reflections on those readings, class projects, technology activities, and exams. This course will be taught using lectures, discussions, and relevant group activities. Learning will be reinforced through the use of hand-on statistical analysis activities, using SPSS, after lectures, discussions and demonstrations. Instruction will be supported by web-based technologies (e.g. WebCT or Blackboard).

REQUIRED TEXT

Dimitrov, D.M. (2008). **Quantitative Research in Education: *Intermediate & Advanced Methods***. NY: Whittier Publications. ISBN: 978-1-7604-285-4

RELATED RESOURCES

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

Thomas, C. L. (2010). Blackboard Learning Resources.

COURSE REQUIREMENTS

1. **Data Analysis Assignments:** Students will be expected to complete individual homework assignments throughout the semester using the SPSS. The homework assignments are for the purpose of reinforcing classroom learning activities and for the self-identification of areas that students would profit for further classroom discussion. There is no individual grade for the completion of the assignments that should be stored in the electronic portfolio (see below).

2. **Examination:** Students will complete a performance-based midterm exam that emphasizes comprehension and application of the basic statistical concepts studied up to that point in the semester.

3. **Connections of Statistical Analyses to Professional Studies: the Research Article Review**. Students are required to select one research article in their area of study that makes use of one or more of the statistical analysis studied in the course. The assignment emphasizes the ability to understand and write an appropriate review of the statistical analysis used in the research article. Guidelines are found in Blackboard.

4. **Final Project:** 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. A copy of the project should be included in the e-portfolio. Guidelines to be distributed separately.

5. **E-Portfolio**: This is the storage medium for your required work. It also conveys your reflections of your learning across the various exhibits that are stored as evidence of your work.

6. **Class Participation and Attendance** are essential. These elements of behavior will reflect the professional attitude implied in the course goals and *will account for 5% of the course grade*. Class participation is assessed by student involvement and completion of in- class data analysis activities (see Appendix C, rubric for e-portfolio). These activities are essential reinforcements to the learning of course content provided through readings, lectures and class discussion. If it is necessary to miss a class, you must notify the instructor (preferably in advance) and are responsible for completing all assignments and readings for the next class.

Grading Policy & Relative Weights

Grading is performance-based and guided by a combination of grading rubrics for written projects and grades on specific assignments and the midterm test. Table 1 summarizes the relative weights, in terms of absolute quality point. Rubrics associated with class participation, the data analysis project, and the electronic portfolio are found in the appendices. Letter grades are derived from individual student deliverables based on the percentage equivalents summarized in Table 2.

Table 1. Relative Weights of Student Products (% of Final Grade)

Class Participation and Attendance (See e-portfolio rubric)	10%
Research Review	15%
Data Analysis Project	35 %
Midterm Examination	25 %.
Electronic Portfolio	15 %
TOTAL	**100 %**

Table 2. Letter Grade Equivalents

A+	98-100%	A	93-97.49%	A-	90-92.49%
B+	88-89.49%	B	83-87.49%	B-	80-82.49%
C	70-79.49%	F	below 70%		

Note:

- All written assignments must be typed and must follow APA format
- Grading on written work will take into account the following factors: quality of written work, knowledge of content area, and adherence to requirements of assignment. all work will be turned in on the assigned dates. A late assignment is subject to a penalty of 10% of the award for every day that it is overdue
- All documents submitted by email must CLEARLY identify the student using the following format: *Jsmith.edrs620.paper short title.doc*

NOTE- WORTHY GMU POLICY STATEMENT & RESOURCES

HONOR CODE:

To promote a stronger sense of mutual responsibility, respect, trust, and fairness among all members of George Mason University and with the desire for greater academic and personal achievement, we, the members of George Mason University, have set forth the following code of honor. Any individual caught in the act of cheating, attempting to cheat, plagiarizing, or stealing will be brought forth before a council of their peers. In the event that the individual is found guilty, he or she will be punished accordingly. For further information, please refer to the University Catalog or Website at www.gmu.edu.

STATEMENT REGARDING DISABILITIES:

If you are a student with a disability and you need academic accommodations, please see me and contact the Office of Disability Services (ODS) at 993-2474. All academic accommodations must be arranged through the ODS. http://ods.gmu.edu

GMU EMAIL ACCOUNTS

Students must activate their GMU email accounts to receive important University information, including messages related to this class.

OTHER USEFUL CAMPUS RESOURCES:

- *WRITING CENTER*: A114 Robinson Hall; (703) 993-1200; http://writingcenter.gmu.edu
- *UNIVERSITY LIBRARIES* "Ask a Librarian" http://library.gmu.edu/mudge/IM/IMRef.html
- *COUNSELING AND PSYCHOLOGICAL SERVICES* (CAPS): (703) 993-2380; http://caps.gmu.edu

UNIVERSITY POLICIES

The University Catalog, http://catalog.gmu.edu, is the central resource for university policies affecting student, faculty, and staff conduct in university affairs.

APPENDIX A
Schedule of Reading Assignments

Date	Reading from text	Chapter
Jan. 24	Class Orientations & Introduction to the Discipline Concepts of measurement in education Introduction to the SPSS Environment	1
Jan. 31	Review of Introductory Statistics: Organizing & Interpretation of Graphic Data	6
Feb. 7	Review of Introductory Descriptive Statistics	6
Feb. 14	Normal distribution	7
Feb. 21	Other distributions; *t*-, *F*- and *chi-square* distributions	7
Feb. 28	Hypothesis testing: One-sample case for the Mean	8
March 6	Hypothesis testing: Two-sample case for the Mean	8
March 13	…… ***Spring Break*** ……	
March 20	**MIDTERM PERFORMANCE -BASED EXAMINATION DUE**	1 - 8
March 27	Hypothesis testing for proportions	9
April 3	Chi-square tests for frequencies & Correlation between two variables	12 & 10
April 10	Simple linear regression	10
April 17	Partial and Part Correlation	11
April 24	Multiple Regression	13
May 1	One-factor Analysis of Variance (ANOVA) Review Discussion of Data Analysis Project [**Portfolios due by May 4 via e-mail]**[1]	14
May 8/15	**Oral Presentation & Submission of Analysis Project**	

Note: Additional materials posted on the **Black Board Learning System**

[1] May 8 is an official Reading Day. If there is class consensus, the May 15 final will be rescheduled for May 8.

APPENDIX B

EDRS 620

RUBRIC FOR QUANTITATIVE ANALYSIS PLAN

GENERAL EVALUATION CRITERIA:

● *Clarity and organization* ● *Comprehensiveness of content* ● *APA style*

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Performance Elements	Quality Points
Introduction Section	**max = 9 points**
Statement of the nature and importance of the problem and literature review related to the issues.	**4-5 points:** 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.
	2-3 points: 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.
	0-1 points: 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	**2 points:** 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.
	0-1 points: 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.	**2 points:** The purpose of the study is connected to the statement of the problem and the research questions are properly described.
	0-1 points: The purpose of the study is not well connected to the statement of the problem and/or the research questions are not properly described.
Method Section	**max = 13 points**
Description of the study sample	**4 points:** 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.
	2-3 points: 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.
	0-1 points: 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)	**2-3 points:** 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.
	0-1 points: Provided is incomplete (or lacking) description of data sources and there is no report on reliability estimates.
Description of the data collection method	**2 points:** Provided is clear, accurate, and complete description of the data collection method **—** e.g., existing students records or online data base.
	0-1 points: 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	**4 points:** Provided is clear, accurate, and complete description of *appropriate* data analysis methods and procedures used to address the research questions.
	2-3 points: Selected are *appropriate* methods and procedures of data analysis, with lack of sufficient clarity, accuracy, and/or completeness in description.
	0-1 points: Some (or all) of the selected data methods and procedures are *not appropriate* for addressing the project research questions.
Results Section	**max = 14 points**
Within-text presentation of results obtained with the statistical data analysis for each research question	**8 points:** Provided is clear, accurate, and complete presentation of relevant results in APA style by project research questions.
	6-7 points: Provided is clear, accurate, and complete presentation of relevant results by project research questions, with some deviations from the APA style.
	5-6 points: Presented are relevant results by project research questions, with some deviations from clarity, completeness, and the APA style.
	4-5 points: Presented are relevant results by project research questions, with some deviations from clarity, accuracy, completeness, and the APA style.
	2-3 points: Some results are irrelevant and/or there are problems with clarity, accuracy, completeness, and APA style.
	0-1 points: Some (or all) results are irrelevant and there are serious problems with clarity, accuracy, completeness, and APA style.
Presentation of tables	**2-3 points:** The tables include all necessary information presented in APA style**.**
	0-1 points: The tables do not include all necessary information and /or there APA style problems.
Presentation of figures	**2-3 points:** The figures are clear and provide relevant information in APA style.
	0-1 points: There are some (or serious) problems with clarity of the figures, their relevance, and/or APA style.
Discussion Section	**max = 14 points**
	8 points: 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.
	6-7 points: 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

Conclusions drawn from the results, findings and implications for theory and/or practice	explanations of the study findings, implications for theory and/or practice, and APA style.
	5-6 points: The conclusions are drawn from the study results, but 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.
	4-5 points: 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.
	2-3 points: 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.
	0-1 points: 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	**2-3 points:** Provides is clear, accurate, and complete presentation of the limitations of the study, with implications for the study findings and their generalization.
	0-1 points: 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	**2-3 points:** 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.
	0-1 points: The recommendations for future research are *not* clearly presented and do not address the necessity for replications and/or further extensions.

TOTAL SCORE: MAX = 50 pts

APPENDIX C

RUBRIC FOR ELECTRONIC PORTFOLIO

Maximum Total Points = 15						
PERFORMANCE ELEMENTS <u>Organization & Participation</u> • Each Section (in class assignments, student commentaries, and data analysis project) is introduced by a brief description and reflection of learning value of activities • Writing is clear, concise, and free of grammatical errors • In class participation as assessed by completion of classroom data analysis assignments	**QUALITY POINTS** **1**	**2**	**3**	**4**	**5**
	max = 15 pts.				

APPENDIX D

Guidelines for Student Literature Commentaries

Goal: To facilitate students identifying the relevance and application of statistical concepts and principles to empirical inquiries in their graduate study areas.

Objectives:
Students will be able to:

1. **select appropriate literature in their area of concentration that exhibits quantitative data analysis procedures**
2. **describe the analytic concepts and procedures being exhibited in the literature**
3. **explain the purpose of the concepts and procedures being exhibited in the literature**
4. **c convey descriptions and explanations in a cogent and precise written form**

Procedures
It is important from the outset to note that this learning experience is not a literature review, but rather a learning exercise that makes use of relevant literature to demonstrate understanding of the use of statistical procedures in the context of one's area of study. It is possible, though not likely, that a single research report can be located that provides sufficient exhibits of the statistical procedures that will be studied during the semester. In this rare occasion, it would be entirely appropriate to use a single report for making the conceptual connections. More than likely, you will need to identify 3 or 4 studies that make use of the array of statistical procedures that are the focus of the course.

This learning experience is ongoing and cumulative in the sense that the connections are to be made after each unit of study material. By making the connections immediately after studying a unit of material, it is envisioned that learning will be reinforced. Brief reports or commentaries are written and ent
ered into an e-portfolio. Students will retrieve the commentaries for class discussions.

The first task is to locate a study in the concentration area that reports results of empirical inquiry in terms of the statistical concepts scheduled for study in the upcoming weeks. For example, we begin our study reviewing tables, graphs, and descriptive statistics. A descriptive study in your area of concentration more than likely will make use of such procedures. Future exemplars from the research literature of your choice should report on the following statistical procedures:

- **Descriptive Statistical Depictions: Frequency tables and at least one of the following figures: histogram, ogive, and box plots**
- **Descriptive Summary Statistics: Measures of central tendency and measures of variability**
- **Statement of research hypothesis**
- **Inferential Statistical Procedures I: the t-test (for independent or dependent samples**
- **Chi-square tests**
- **Zero-order correlation and simple regression analysis**
- **Multiple regression or one-way ANOVA**

After reading an appropriate research article (from peer review journal), a three-page (max.) commentary is prepared with the following:[2]

1. **Abstract copied from the study**
2. **A brief paragraph (2-3 sentences) describing the purpose of the study**
3. **No more than three paragraphs describing procedures**
4. **Excepts (copied and pasted) from the study depicting the relevant statistical concepts or procedures as reported in the study**
5. **Commentary: Give a description of the statistical procedure, including its general purpose and specific use in the study. The commentary also provides an interpretation of the results of the statistical procedures used in the study.**

[2] Omit sections 2 & 3 from subsequent commentaries whenever a new assignment is making use of a previously reported atudy.

GRADING RUBRIC FOR STUDENTS' COMMENTARIES

Maximum Total Points = 25						
PERFORMANCE ELEMENTS	**QUALITY POINTS**					
	1	**2**	**3**	**4**	**5**	
Organization & Quality of Writing						
• Each Section is completed and delineated by section headings (abstract, statement of the purpose, description of procedures, excerpts of the statistical procedures, and commentary)						
• Quality of writing						
	max = 10 pts.					
Student Commentaries on Research Literature						
• Reference is provided for each source that is written in APA style						
• Relevant excerpts from data analysis sections of the literature source is presented						
• Accuracy of student commentary on the *purpose and interpretation* of the statistical procedures						
• Comprehensiveness: An excerpt and commentary is provided for each analytic procedure: graphic or table display, descriptive statistics, t-test or one way ANOVA, correlation, and multiple regression						
	max = 15 pts.					

APPENDIX E

Important Dates (Modified from GMU, January 11, 2010)

Dates listed on this page are for full semester courses only.

Event	*Date*
Martin Luther King Day (no classes)	Mon Jan 18
First day of classes; last day to submit Domicile Reclassification Application; Payment Due Date	Tues Jan 19
Last day to drop with no tuition penalty	Tues Feb 2
Last day to add classes—all individualized section forms due	Tues Feb 2
Last day to drop with a 33% tuition penalty	Feb 9
Last day to drop with a 67% tuition penalty	Feb 19
Last day to drop	Fri Feb 19
Selective Withdrawal Period (undergraduate students only)	Mon Feb 22 - Fri Mar 26
Spring Break (Saturday classes meet Mar 7)	Mon Mar 8 - Sun Mar 14
Incomplete work from fall 2009 due to instructor	Mar 26
Incomplete grade changes from fall 2009 due to registrar	Apr 2
Last day of classes	Mon May 3
Reading Days	Tue May 4
E**xam Period** (beginning at 7:30 a.m. on Wednesday, May 5)	Wed May 5 - Wed May 12
Degree Conferral Date	May 15, 2010