COURSE SYLLABUS

GEORGE MASON UNIVERSITY
COLLEGE OF EDUCATION AND HUMAN DEVELOPMENT
PROGRAM NAME

EDRS 620 Quantitative Inquiry in Education (3:3:0)
EDRS 620 001
Spring 2010
Tuesday, 7:20-10:00 pm
~~120~~ 124Robinson B

PROFESSOR(S): **Charles L. Thomas, PhD**
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Office hours **Tue, 4:00-5:00 & Thu., 3:00-4:00 pm**
              Other Times arranged by appointment
Email address cthomas@gmu.edu

COURSE DESCRIPTION:
Prerequisites: EDRS 590 or equivalent experience
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.

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).

LEARNER 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

This course is designed to enable students to:
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.

PROFESSIONAL STANDARDS: (e.g., INTASC, Professional Organization)
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

REQUIRED TEXTS:
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, PERFORMANCE-BASED ASSESSMENT, AND EVALUATION CRITERIA:

1. **Data Analysis Assignments:** Students will be asked to complete in class individual data analysis assignments throughout the semester using the SPSS . Completed assignments 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. **Commentaries on Connections of Statistical Analyses to Professional Studies**. Throughout the semester, students will make use of literature in their concentration areas to make connections with their acquired understanding of statistical concepts and analysis procedures. The connections, in the form of brief commentaries, will be stored in an e-portfolio (See Appendix C, Rubric for e-portfolio). See Appendix D for guidelines..

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.

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%		

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

Class Participation and Attendance (See e-portfolio rubric)	5 %
Individual Study Assignments	5%
Data Analysis Project	30 %
Midterm Examination	20 %.
Student Commentaries	25%
Electronic Portfolio	15 %
TOTAL	**100 %**

Table 2. Letter Grade Equivalents

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

NOTE- WORTHY GMU POLICY STATEMENT & RESOURCES

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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.

COLLEGE OF EDUCATION AND HUMAN DEVELOPMENT STATEMENT OF EXPECTATIONS:

All students must abide by the following:

Students are expected to exhibit professional behavior and dispositions. See http://gse.gmu.edu/facultystaffres/profdisp.htm for a listing of these dispositions.

Students must follow the guidelines of the University Honor Code. See http://www.gmu.edu/catalog/apolicies/#Anchor12 for the full honor code.

Students must agree to abide by the university policy for Responsible Use of Computing. See http://www.gmu.edu/facstaff/policy/newpolicy/1301gen.html. Click on responsible Use of Computing Policy at the bottom of the screen.

Students with disabilities who seek accommodations in a course must be registered with the GMU Office of Disability Services (ODS) and inform the instructor, in writing, at the beginning of the semester. See http://www2.gmu.edu/dpt/unilife/ods/ or call 703-993-2474 to access the ODS.

PROPOSED CLASS SCHEDULE

Date	Topic/Learning Experiences	Readings and Assignments	
Jan. 19	Class Orientations & Introduction to the Discipline Concepts of measurement in education. *Introduction to the SPSS Environment*	Chapter 1	
Jan. 26	Review of Introductory Statistics: Organizing & Interpretation of Graphic Data	Chapter 6	
Feb. 2	Review of Introductory Descriptive Statistics *Student Commentaries on Descriptive Statistical Depictions*	Chapter 6	
Feb. 9	Normal distribution *Student Commentaries on Descriptive Summary Statistics*	Chapter 7	
Feb. 16	Other distributions; *t-*, *F-* and *chi-square* distributions *Student Commentaries on Statement of Research Hypothesis*	Chapter 7	
Feb. 23	Hypothesis testing: One-sample case for the Mean	**Chapter 8**	
March 2	Hypothesis testing: Two-sample case for the Mean *Student Commentaries on Inferential Statistical Procedures*	Chapter 8	
March 9	***Spring Break***		
March 16	**MIDTERM PERFORMANCE -BASED EXAMINATION DUE**	Chapter 1-8	
March 23	Hypothesis testing for proportions	Chapter 9	
March 30	Chi-square tests for frequencies & Correlation between two variables *Student Commentaries on chi-square analysis*	Chapter 12 & 10	

April 6	Simple linear regression *Student Commentaries on simple correlation and regression analysis*	Chapter 10	
April 13	Partial and Part Correlation	Chapter 11	
April 20	Multiple Regression	Chapter 13	
April 27	One-factor Analysis of Variance (ANOVA) Review Discussion of Data Analysis Project *Student Commentaries on Multiple Regression or one-way ANOVA*	Chapter 14 [**Portfolios due by May 4 via e-mail**][1]	
May 11	**Oral Presentation & Submission of Analysis Project**		

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Notes: 1. Additional materials posted on the **Black Board Learning System**
         2. May 4 is an official Reading Day. The May 11 final can be rescheduled for
                  May 4 based on students' unanimous decision.

ASSESSMENT RUBRIC(S)

COURSE
Assignment rubric

Name: _____

Date: _____

	No Evidence 1	Beginning (Limited evidence) 2	Developing (Clear evidence) 3	Accomplished (Clear, convincing, substantial evidence) 4	SCORE
CRITERIA					

EDRS 620

QUANTITATIVE METHODS IN EDUCATION RESEARCH

RUBRIC FOR QUANTITATIVE ANALYSIS PLAN

GENERAL EVALUATION CRITERIA:

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

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PERFORMANCE ELEMENTS	QUALITY POINTS				
	1	2	3	4	5
Cover page clearly organized with title, name, date, and boiler plate (partial fulfillment, Instructor's name, and school					
Introduction Section a. Statement of the problem, its importance, and description of two (2) previous studies related to the problem.					
b. Justification of the need for this study					
c. Statement of research questions /research hypotheses.					
max = 12 pts.					
Methods Section I:					
a. **Sample:** description and justification of proposed sampling procedures					
b. **Data collection:** description of the proposed data collection method					
c. **Experimental Procedures:** Identification and description of any interventions or treatments, independent and dependent variables, or correlates					
max = 11 pts.					

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Methods Section II **Statistical Data Analysis Plan**: Description of the statistical methods used to address the research questions in the project	QUALITY POINTS				
	1	**2**	**3**	**4**	**5**
a. Description of contrived/actual SPSS data file					
b. Description and purpose of graphics relevant to the data analysis plan					
c. Description of descriptive statistics to be used and their purpose					
d. Statement of null hypothesis related to each research question					
e. Description of the inferential statistical analyses procedures and their connection to each research question					
	max = 17 pts.				
1. Discussion of Results/Conclusions Section a. Presentation of results obtained with the statistical data analysis for each research question					
b. Conclusions drawn from the results .					
	max = 10 pts.				

TOTAL SCORE: MAX = 50 pts

APPENDIX C

RUBRIC FOR ELECTRONIC PORTFOLIO

Maximum Total Points = 15					
PERFORMANCE ELEMENTS Organization & Participation	**QUALITY POINTS**				
	1	**2**	**3**	**4**	**5**
• 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					
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.

<u>Objectives:</u>
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**

<u>Procedures</u>
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.**

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

Maximum Total Points = 25					

PERFORMANCE ELEMENTS	QUALITY POINTS				
Organization & Quality of Writing	1	2	3	4	5
• 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.					

GRADING RUBRIC FOR STUDENTS' COMMENTARIES

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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
Exam Period (beginning at 7:30 a.m. on Wednesday, May 5)	Wed May 5 - Wed May 12
Degree Conferral Date	May 15, 2010

Comments: