Advanced Application of Quantitative Methods

George Mason University, Graduate School of Education

Prof. Dimiter M. Dimitrov, Ph.D.   SPRING **2011**
EDRS 821 001
Class Meeting: M, 4:30pm-7:10pm, IN 326
Office: West Building, Room 2007   **Phone:** (703) 993-3842
Office Hours: M (3:00pm-4:00pm) & W (5:30-6:30pm)   **E-mail:** ddimitro@gmu.edu
Other hours may be arranged by appointment.

Course Description

This course will provide advanced study of applications of quantitative methods in the practice of educational research and will reinforce and build upon concepts and skills acquired in EDRS 811. It will employ a modular approach and will contain advanced study of techniques appropriate to analysis of data from tests and surveys; group-experimental and quasi-experimental design; selected multivariate procedures and factor analysis. Students will learn through a combination of text reading assignments, critical analysis of professional journal articles, 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 (articles), to collect and analyze data using the Statistical Package for Social Sciences (SPSS), and to provide written reports of methodology and results.

Prerequisites: Successful completion of EDRS 811 (or its equivalent) or permission of instructor.

Course Objectives

Upon successful completion of the course, students should be able to:

1. Analyze test and survey data using appropriate procedures and indexes such as item difficulty, item discrimination, score reliability, and criterion-related validity.
2. Develop univariate factorial designs with between-subjects and within-subjects (repeated measures) factors, conduct the data analysis, and interpret results associated with main and interaction effects.
3. Develop multiple regression models, conduct the analysis, and interpret the results.
4. Develop logistic regression models, conduct the analysis, and interpret the results.
5. Develop multivariate factorial design (for the comparison of two or more groups on a set of two or more dependent variables), conduct the analysis, and interpret the results.
6. Understand the principles of exploratory and confirmatory factor analysis and interpret results obtained trough computer applications in factor analysis.

Course Methodology: This course cmonsists of lectures, large group discussion, in class activities, and individual/group assignments.

Required Texts

Dimitrov, D. M. (2009). *Quantitative Research in Education: Intermediate & Advanced Methods*. Oceanside, NY: Whittier Publication. ISBN: 978-1-57604-301-1

Course Requirements: It is expected that each of you will:
(1) Read all assigned materials for the course.
(2) Participate in classroom activities that reflect critical reading of materials.
(3) Complete two in class assignments and HW assignments.
(4) Design and conduct a pilot research study
(5) Present the pilot research study in class in a poster format.
(6) Write a critical analysis of an article from a professional journal that applies methods discussed in this course.
(7) Attend each class session.

Course Evaluation

1. In class/Homework Assignments: Students will be asked to work individually on homework assignments throughout the semester.

2. Midterm Examination (Closed books and notes)

3. Pilot Research Study: This course requires students to develop and conduct a pilot-research study in an educational setting. This study is intended to reflect what you have learned from this course. It should be written in a way that one would submit for a national professional conference paper presentation. Other requirements for this course are designed to build up bases for the final pilot research proposal. Research papers must be handed in on time and must adhere to the APA Publication Manual Guidelines.

This pilot research study will be divided into 6 sequential parts:

1. Identify broad topic of interest; conduct a literature review; discuss significance of the proposed study; state purpose and hypotheses.
2. Methods- describe sample; identify measures to test hypotheses; discuss procedures and design of the study.
3. Data collection.
4. Data analysis.
5. Write the results section.
6. Discussion and Conclusion.

The presentation of the final paper will take place the last day of class in APA format of (overhead or power-point) paper presentations. Please see guidelines posted on the AERA website, www.aera.net.org. After completing the research study, reflect on that experience. What did you learn from it? How do you think course material helped you carry out the study? [**Scoring rubric** for the research paper is provided on pp. 7-8]

4. Final Examination: Semi-comprehensive (closed books and notes) examination

5. Class Participation and Attendance Policy: Because of the importance of lecture and discussion to your total learning experience, I wish to encourage you to both attend and participate in class regularly. Attendance, punctuality, preparation, and active contribution to small and large group efforts are essential. These elements of your behavior will reflect the professional attitude implied in the course goals and will account for 5% of your course grade. With reference to the grading scale described later in this syllabus, you will note that this percentage is equivalent to a full letter grade. Students who must miss a class must notify the instructor (preferably in advance) and are responsible for completing all assignments and readings for the next class.

RUBRIC FOR PARTICIPATION AND ATTENDANCE:

ELEMENT	Distinguished (4-5 pts.)	Proficient (3 pts.)	Basic (2 pts.)	Unsatisfactory (1 or 0 pts.)
Attendance & Participation	The student attends all classes, is on time, is prepared and follows outlined procedures in case of absence, the student actively participates and supports the members of the learning group and the members of the class.	The student attends all classes, is on time, is prepared and follows outlined procedures in case of absence; the student makes active contributions to the learning group and class.	The student is on time, prepared for class, and participates in group and class discussions. The student attends all classes and if an absence occurs, the procedure outlined in this section of the syllabus is followed.	The student is late for class. Absences are not documented by following the procedures outlined in this section of the syllabus. The student is not prepared for class and does not actively participate in discussions.

GRADING SCALE:

Class Participation and Attendance	5 pts.
Individual Homework Assignments	10 pts.
Pilot Research Study	30 pts
Midterm Examination	25 pts.
FINAL EXAMINATION	30 pts.
TOTAL	**100 pts**

Letter grades will be assigned as follows:

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%		

Honor Code

All evaluations and homework will be taken under the GMU Honor Code. Students are expected to abide by the honor code set forth in the current edition of the Student Handbook. All exams, assignments and papers are honor work. That means that students must not give nor receive any unauthorized assistance. While members of a team may collaborate on written paper assignments, they may not give or receive assistance from other teams. Plagiarism is also a violation of the honor code. The University's Honor Code guidelines for academic honesty are at: http://mason.gmu.edu/~montecin/plagiarism.htm

Learning Disabilities

Students with any type of documented disability that may interfere with their learning in this class may negotiate a reasonable accommodation with the instructor. If you have not contacted the Office of Disability Services, and you have a disability please make sure to register for services.

GSE Statements of Expectations

The Graduate School of Education (GSE) expects that all students abide by the following:

Students are expected to exhibit professional behavior and dispositions. See gse.gmu.edu for a listing of these dispositions.

Students must follow the guidelines of the University Honor Code. See http://www.gmu.edu/catalog/apolicies/#TOC_H12 for the full honor code.

Students must agree to abide by the university policy for Responsible Use of Computing. See http://mail.gmu.edu and click on Responsible Use of Computing at the bottom of the screen.

Students with disabilities who seek accommodations in a course must be registered with the GMU Disability Resource Center (DRC) and inform the instructor, in writing, at the beginning of the semester. See www.gmu.edu/student/drc or call 703-993-2474 to access the DRC.

READING FROM TEXT

DATE	TOPIC	Text Chapter
January 24	Review. Multiple regression	8, 10, 13
January 31	One-factor analysis of variance (ANOVA)	14
February 7	Two- and three-factor ANOVA	15
February 14	Analysis of covariance (ANCOVA)	16
February 21	Multiple regression and ANOVA	17
February 28	**MIDTERM EXAMINATION**	
March 7	ANOVA with random factors Repeated-measures ANOVA	18 19
March 14	Spring Break (no classes)	
March 21	Logistic regression	20
March 28	Multivariate analysis of variance (MANOVA)	21
April 4	Factor analysis	22, 23
April 11	Elements of structural equation modeling-I	24
April 18	Elements of structural equation modeling-II	24
April 25	Overall Review	
May 2	Project Presentations	
May 9	Reading Day	
May 16	**FINAL EXAMINATION**	

Name: _____   **Date:**_____

Semester: _____   **Grade:** _____ pts.

EDRS 821

ADVANCED APPLICATION OF QUANTITATIVE METHODS

RUBRIC FOR RESEARCH PAPER

GENERAL EVALUATION CRITERIA:

- *Clarity and organization*
- *Comprehensiveness of content*
- *APA style*   TOTAL SCORE: **MAX = 30 pts.**

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 nature of the problem and its importance (include also a description of some recent studies related to the issues)					
b. Justification of the need for this study					
c. Statement of specific research questions.					
max = 6 pts.					
Methods Section a. **Sample:** description of the **sample (**size, subgroups, demographic characteristics)					
b. **Data:** description of the data (instruments, scales, reliability of scores)					

	1	2	3	4	5
c. **Data collection:** description of the data collection method (e.g., using existing records on student)					
d. **Statistical Data Analysis**: Description of the statistical methods and procedures used to address the research questions in the project					
max = 8 pts.					

Results Section [Presentation of results obtained with the statistical data analysis for each research question]

Relevance, accuracy, completeness, and APA style of the results provided

	QUALITY POINTS				
	1	2	3	4	5
a. within text of the results section,					
b. tables (each on a separate page) after references					
c. figures (each on a separate page) after tables					
max = 8 pts.					

5. Discussion/Conclusions Section

	1	2	3	4	5
a. Conclusions drawn from the results [findings and implications for theory and/or practice] b. Statement of limitations					
c. Recommendations for future research					
max = 8 pts.					