

ERM 681: Intermediate Statistical Methods in Education

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Course Overview: This advance course covers statistical concepts and methods that can be applied in educational research, behavioral research and other social science research. It will basically cover the last half of the Howell text. Thus, the first couple of chapters that we cover should be a review. We will begin with one-way ANOVA, and the cover a priori and post hoc tests. These concepts will be expanded with factorial analysis of variance and repeated measures designs. Then we will revisit linear regression and talk about the situation where there are multiple independent variables: multiple regression. In the next two chapters we will look at analysis of covariance and log-linear models. In the last chapter we will discuss bootstrapping and non parametric analyses. We will spend about two classes per chapter except the last chapter. Finally, you will be expected to become proficient with a standard statistical computing software called Statistical Package for the Social Sciences, **SPSS**, and will be responsible for using this software to carry out assigned homework and examination problems.

Course Objectives:

1. To increase your statistical vocabulary and techniques that enable you to become statistically literate so that you can interpret and critically evaluate statistical methodology, reported outcomes and inferential interpretations from published educational and other social science or behavioral research;
2. To be able to identify appropriate statistical procedures (parametric and nonparametric) for addressing specified educational or behavioral research questions; demonstrate comprehension of the rationale underlying the use of these procedures, and when needed, be able to select alternative statistical procedures to solve certain research problems;
3. To identify the assumptions critical to using specified statistical procedures and be familiar with the consequences when assumptions are violated; and

Required text:

Howell, David C. (2002). *Statistical Methods for Psychology*, 5th Edition. Belmont, CA: Duxbury Press. Note: You can use the 4th edition if you have it.

Recommended text:

Morgan, S. E., Reichart, T. & Harrison, T. R. (2002) **From Numbers to Words**, Boston, MA: Allyn and Bacon.

Course Requirements:

Homework:

Homework assignments will consist mainly of problems from the Howell textbook, but on occasion I may substitute questions from other texts. Whenever possible, show all of your work. Make sure you put your name and indicate the exercise set number at the top of your paper and ***highlight*** your answers. Sometimes you will be required to repeat the analysis of a problem in SPSS on the computer. For problems done on the computer simply attach a copy of the output and highlight your answers. Homework will usually be due at the beginning of class the week after it has been covered in lecture. Due dates will always be specified. Homework will be graded and returned to you the week after it is received.

Exams:

There will be one midterm exam and one final exam. Each exam will have two parts: a multiple-choice part and a problem solving part. The exams are NOT cumulative. That is, the Midterm will cover Chapters 11, 12, 13, 14, and the Final will cover Chapters 15, 16, 17, and 18. Questions will be testing the learning objectives as stated in the handouts. Exams will be “take home” exams. They will be passed out at the end of one class and due at the beginning of the next class. **The UNCG Academic Integrity Policy applies for all examinations.**

One week prior to each exam you will receive a description of what the exam will cover, and a practice exam. I will pass out the answers and go through the practice exam at review sessions. There will be multiple review sessions (we’ll decide on times so that everyone can attend at least one) held outside of our regular class time to go over the practice exam, homework, and any other questions students may have. Review sessions are not mandatory.

Exam Dates

	<u>Exam Passed Out</u>	<u>Exam Due</u>
MIDTERM	Week 8	Week 9
FINAL	Week 15	Week 16

Grading

Your grade will be determined by your performance on your exams and your exercise sets using the following criteria. There will be 10 exercise sets, each worth 10 points, for a possible total of 100 points.

The total possible points for each exam is:

Midterm	100 pts
Final	100 pts

Thus, the total number of points possible is 300. Grades will be assigned as follows:

<u>Point Range</u>	<u>Grade</u>	<u>Point Range</u>	<u>Grade</u>
270-300	A	210-224	B-
255-269	A-	180-209	C
240-254	B+	0-179	F
225-239	B		
225-240			

Lectures

At the beginning of each class I will pass out a handout of my powerpoint slides. The handout will contain a list of the learning objectives (things I want you to learn from the lecture), a list of new vocabulary and an outline of the lecture. Occasionally, I will hand out short self-tests as a review of what we covered in the previous class. The self-tests will be short (five to ten items long) and will be similar to the types of items you will receive on the exam. They will cover key concepts that you will be responsible for knowing. We will go through them, discuss them, but they will not be collected. They are intended to serve as a check on your understanding and will provide a good review when studying for the exam. **Reading assignments should be done BEFORE class – it will make the lectures more understandable.**

Organization

It is extremely important to be organized. I suggest that you purchase a 2 1/2" three-ring binder for your handouts and notes. Organization will facilitate and promote understanding. To help you out all handouts will be holed-punched and will be color coded as follows:

<u>Handout</u>	<u>Color</u>
Notes, Pretests & Answers	White
Example Problems/solutions	Blue
SPSS annotated examples	Yellow
Homework Exercises	Pink
Journal article examples	Green

Study Groups

I encourage you, if it is at all possible, to form your own study groups. Sharing questions and hearing others describe concepts will oftentimes facilitate studying. Explaining or teaching a concept to someone is the one of the best ways to realize what you know and what you don't know. Besides there is the old adage about "misery loves company".

Class attendance

The lectures and in-class discussions will supplement, not duplicate, the material in your text book. It is important to attend class regularly. *If you need to miss a class, please let me know so arrangements can be made to get you a copy of the handouts.*

Asking questions

Whenever something is covered in lecture and you do not clearly understand please do not be afraid to ask for further clarification. Sometimes students avoid asking simply because they're lost and feel they don't even know how to phrase a question. All you need to do is just ask me to repeat or clarify and I will be happy to reword or give more examples so that you can understand the material better.

Tentative Schedule*

<u>Week</u>	<u>Topic</u>	<u>Reading Assignment</u>
1 and 2	Introduction; review syllabus; pretest; Simple analysis of variance, SPSS, Simulation software: ANOVASIM.EXE	Ch. 11 (pp. 319-368)
3 and 4	Multiple comparisons among treatment means; A Priori comparisons, Post Hoc comparisons	Ch. 12 (pp. 369-420)
5 and 6	Multivariate analysis of variance; interactions; simple effects; power analysis; expected mean squares	Ch 13 (pp. 421-470)
7 and 8	Repeated-measures designs MIDTERM EXAM PASSED OUT (Week 8)	Ch 14 (pp. 471-532)
9 and 10	Multiple regression; standard errors and tests of coefficients; partial and semipartial correlations MIDTERM EXAM DUE (Week 9)	Ch. 15 (pp. 533-602)
11 and 12	Analysis of variance and covariance as linear models One-way analysis of covariance; interpretations	Ch. 16 (pp. 603-654)
13 and 14	Log-linear analysis; Two-way contingency models; Odds and odds ratios; treatment effects	Ch. 17 (pp. 655-690)
15	Resampling and nonparametric analyses .FINAL EXAM WILL BE PASSED OUT	Ch. 18 (pp. 691-726)
16	FINAL EXAMS ARE DUE	

*Some topics will require less time than anticipated, others more. We will make adjustments during the semester if necessary.