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Psychological Statistics, Research Methods and Design (final draft 12/3/14)
PSY 631T Fall 2014

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There will be no review of basic statistics or research design issues in this course. It is assumed that you now have a solid background in these basics. If not, you will have to see me during office hours or after class to get advice on how to proceed.

	Topics	**Readings & Homework**
Aug 26 Tu	Introduction to the course	syllabus, blackboard, text books
28 Th	**Test #1**	see study sheet on Blackboard
Sep 2 Tu	Normal distribution, GLM Central Limits Theorem	The Underlying Model
4 Th	z-test, t-tests and ANOVA	HmWk #1: Three uses of the t-test Green et al. lessons 22, 23, 24 due Sep 11th
9 Tu	Run three t-tests and discuss APA style write up	
11 Th	1-way ANOVA	Howell Chapter 11
16 Tu	Finish 1-way ANOVA	HmWk #2: Green lesson 25 (use exercise file 2) due Sep 23
18 Th	Multiple Comparisons	Howell Chapter 12
23 Tu	Post hoc and planned comparisons	HmWk #2A Polynomial Contrasts due Sep 30
25 Th	Review for exam	
30 Tu	**Test # 2**	
Oct 2 Th	Factorial ANOVA	Howell Chapter 13 HmWk #3: Green et al. lesson 26 due Oct 14
7 Tu	Simple effects testing	
9 Th	Finish ANOVA, Three and four-way	
14 Tu	Expected Mean Squares	see "Expected Mean Square" on Blackboard. This

material was copied from the various places in Howell 6th edition where EMS was discussed. Read it in order to better understand coverage in CH13

16 Th	**Fall Recess (Oct 16 to 19) No Class**	
21 Tu	Nested designs	Howell p. 434 to437
23 Th	Transforming data	Howell 346 to352

28 Tu   Test #3

<u>30   Th   One-Way Repeated Measures ANOVA</u>   Chapter 14
HmWk # 4 Green lesson 29.
Due Nov 6

Nov 4   Tu   Mixed (split-plot designs)   HmWk #5: on SPSS run Howell Data sets
14.3, 14.4, 14.7, and 14.11 to reproduce handouts.
Due Nov 18

<u>6   Th   More on mixed designs</u>
11   Tu   Finish mixed designs, start regression

13   Th   Regression/ Multiple regression   Chapter 15
HmWk #6 Stepwise and venn diagrams
<u>.   see blackboard assignment. Due Dec 4</u>
18   Tu   Running regression on SPSS

<u>20   Th   Partial and semi-partial correlations, stepwise regression</u>
Thanksgiving Recess (Nov 22 to Nov 30) No Class
Dec 2   Tu   Finish Regression: Dummy coding, mediation, moderation and cross validation

<u>4   Th   Chi Square (other non-parametric tests)   Chapter 6</u>
9   Tu   review for exam   HmWK #7 Green lessons 40 and 41
Due Dec 11
<u>**The Final Exam: (25% of grade) (Thursday Dec. 11th, 5:00 to 7:30)**</u>

TEXT: 1)   <u>Statistical Methods for Psychology</u> (8th ed.) by D. Howell, Wadsworth Cengage Learning, 2013
2)   <u>Using SPSS for Windows and Mac: Analyzing and Understanding Data</u> (6th ed, but any edition
should work) by Green and Salkind, Pearson Prentice Hall

1.   I see this course as an important first step in a three or four course statistics sequence that most
Psychology Graduate students will move through during the next 2 or 3 years. There is no substitute
for getting a strong understanding of the basics that underlie the General Linear Model and the very
notion of significance testing.

2.   I know that you all "want to learn", but I also know that some students avoid doing the necessary
reading and class preparation until days before exams. This does not work very well in statistics.
Students who do this will often fault me for going too fast or not being clear in lecture, but lecture
presupposes that you have done the assigned reading. I think you should know that I have a very
high opinion of our graduate students. I expect you all to be highly motivated and highly capable
with some variation in math ability. I just caution you to avoid the procrastination trap. I expect you
to be among the best groups of students I've ever taught. Please come to my office hours as soon as
you develop questions or confusions. The time to remediate is before, not after, exams. Also form
study groups. There is no need to struggle on your own.

3.   I hope that you are a self-motivated learner who learns actively (as opposed to passively). Don't
just read what you're told to read when you're told to read it. If the book is talking about power and
you are lost, it's time to review power. If the book is talking about repeated measures designs and
you haven't a clue, review that topic. If I try to review everything, this will just be undergraduate
Introduction to Statistics all over again.

4.   Again, study groups seem to work very well! Consider forming a study group. You will probably

Why learn Statistics?

Math is the most powerful tool ever invented by mankind. When coupled with scientific methodologies, math helps us to see through our own desires and prejudices and helps us uncover the truth. All humans, including scientists, are biased in too many ways to count, but math and the scientific method, when applied correctly, can cut through this fog and help us see more clearly.

More importantly, you are on your way to becoming a professional Psychologist and the methods of this course are the methods of your discipline. I'm sure you chose psychology because you want to work with people, but I hope you know enough now to understand that working effectively with people requires working with numbers, math, probability and statistics. Human abilities, characteristics, interests etc. must be quantified and analyzed if we ever hope to positively affect those things. So statistics and research methods are not necessary evils, they are the very tools that enable progress in our field. Embrace the methods that will enable you to read, comprehend and engage in the science of Psychology (and virtually any other field of study).

More practically, a good understanding of statistics and research methods will make you more employable upon graduation.

Main Objectives of the course

1. You should learn to conceptualize various data sets in terms of the research design that was employed and be able to articulate what was done using appropriate language.
2. This should enable you to choose the correct statistical procedure for analyzing a set of scores to answer a particular question.
3. You should learn or relearn many of the research methods and design terms needed for professional discussions.
4. You should learn much about the various issues surrounding ANOVA
5. You should understand effect size and power as they relate to any analysis
6. You should learn to generate and interpret SPSS output for basic methods (t-tests, ANOVA, Chi-Square)
7. You will come to understand the General Linear Model (GLM), which underlies all of this.
8. You will get a very basic (advanced undergraduate level) introduction to Multiple Regression
9. You should learn to write up your findings in APA format.

Grades

Course grades will be based on three 100-point exams, each worth about 25 % of the course grade. In addition there will be some homework that collectively adds to the remaining 25 % of the grade. Class participation and attendance will be noted and may influence grading. In other words students who appear motivated and who participate in class may benefit in their final grade. I recognize this is subjective. My intention is to reward serious effort when appropriate.

Course readings beyond our textbooks
In addition to assigned readings in the Howell book and in Green and Salkind there will be 4 or 5 assigned articles on statistical topics related to the course. These will be posted on the Blackboard website under the section on Course Assignments. The first of these is entitled "The New Statistics: Why and How"