

BLOOMSBURG UNIVERSITY
Department of Psychology
Course Syllabus

Course: Advanced Experimental Design

Catalog # 48.464.01

Spring 2011

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Class Schedule: M W 3 – 4:15 pm

Office hours: MWF 10:20-11 am, M W 1:30-3 pm

Course Description: Presents an advanced consideration of the planning, conduct and evaluation of research in the behavioral and biological sciences, employing parametric and nonparametric statistics. Emphasizes inferential statistics, design, analysis, interpretation, reporting, and computer utilization. Lecture, class discussions, problem solving, videotapes, use of SPSS software, homework assignments, quizzes, exams, and student presentations and papers will be used to meet the instructional goals.

Prerequisites: 48.101, 48.160, 48.281, 48.282 and consent of the instructor

Learning Objectives

Upon successful completion of this course, students will be able to:

1. describe data using descriptive statistics or frequency tables.
2. create graphical representations of data.
3. develop appropriate research designs with consideration of the concepts of control, confounding, covariation, and sources of variability in the experiment or study.
4. assess and interpret differences between group means using t-tests or ANOVA.
5. choose, carry out, and correctly interpret the appropriate ANOVA procedure for between subjects, within subjects and mixed designs.
6. for a given ANOVA procedure, choose, carry out, and interpret an appropriate multiple comparison test for main effects and interactions.
7. select appropriate statistical test(s) to use to answer various questions about a dataset.
8. describe the rationale for the statistic(s) used to answer questions and appropriately convey the information obtained from the statistic(s) in written form.
9. utilize SPSS statistical software and other microcomputer applications to carry out a variety of data analysis and presentation tasks

Students will demonstrate their attainment of these learning objectives during class discussions, by completing data analysis assignments, by working through problems during class, in presentations/papers and on quizzes and exams.

Required Texts

Howell, D. C. (2007). *Statistical Methods for Psychology* (6th ed.). Belmont, CA: Thomson Wadsworth.

Cronk, B. C. (2008). *How to Use SPSS: A Step-by-Step Guide to Analysis and Interpretation* (5th ed.). Glendale, CA: Pycszak Publishing.

American Psychological Association. (2010). *Publication Manual of the American Psychological Association* (6th ed.). Washington, DC: Author.

On the course schedule below readings denoted with an “H” refer to the Howell text and a “C” refers to Cronk.

Attendance

Attendance is required for all class meetings. It will be important for your understanding of the material as well as your engagement in discussion and problem solving with other students and the instructor. A tenth of your total grade consists of attendance and participation.

Evaluation/grading (all assignments must be completed in order to receive a passing grade)

Class participation and attendance 10 points
Analysis assignments (3 @ 10 ea) 30 points
Article presentation 5 points
Quiz 5 points
Research presentation/paper 15 points (presentation 5/paper 10 points)
Exam #1: 10 points Exam #2: 10 points Final Exam: 15 points

Grade Ranges

A = 90-100 B = 80-89.99 C = 70-79.99 D = 60-69.99 E = <60

Course Schedule (subject to modification)**Tentative course schedule (subject to change, any changes will be discussed in class):**

| <i>Date</i> | <i>Topic(s)</i> | <i>Reading(s)</i> |
|---------------|--|--|
| 1-17 | Introductions, review syllabus, discuss structure of course, pretest. | |
| 1-24 | Tripartite model of anxiety and depression – background – description of dataset Descriptive vs. inferential statistics Variables and levels of measurement | H - Ch 1 |
| 1-31 | SPSS: Getting started/entering & modifying data Organizing/displaying data Distributions; Measures of central tendency & variability SPSS: Descriptive statistics/graphing data | C – 1 & 2 H - Ch 2 C – Ch 3 & 4 |
| 2-7 | Normal distribution and z scores Sampling distributions Hypothesis testing Effect size | H – Ch 3 H – Ch 4 C – Appendix A |
| 2-14 | Probability Exam #1 | H – Ch 5 |
| 2-21 | Hypothesis tests of means z test, t tests SPSS: Parametric inferential statistics Power Nonparametric equivalent of t test | H – Ch 7 C – Ch 6 (pg.53-65) H – Ch 8 H – pg 649-659/C – pg 90-95 |
| 2-28 | Analysis of Variance (ANOVA) No class week of 3-7-11 – Spring Break | H – Ch 11 C – pg 65-69 |
| 3-14 | Nonparametric equivalent of ANOVA Multiple comparisons | H - 659-662/C – 95-98 H – Ch 12 |
| 3-21 | Exam #2 Factorial ANOVA | H – Ch 13 |
| 3-28 | Factorial ANOVA (cont) | C – pg 69-72 |
| 4-4 | Repeated Measures ANOVA | H – Ch 14 C – pg 72-79 |
| 4-11 | Repeated Measures ANOVA (cont) | |
| 4-18 | Student presentations | |
| 4-25 & 5-2 | Student presentations/Course evaluations | |

Final Exam: Friday, May 6, 2:45-4:45 pm

You will need a good calculator (minimally able to do squares and square roots).

Quiz

Two quizzes will be given during the semester. One quiz grade will consist of a presentation of a research article that utilizes a statistical technique we are studying. A sign up sheet will be available a couple of weeks into the semester for dates and topics. Format of the other quiz is to be determined.

Exams

There will be three exams during the course of the semester including a comprehensive final exam. **If you miss an exam for any reason it is your responsibility to contact me to arrange for a make up prior to the next scheduled class meeting, failure to do so will result in a zero for that exam.** The problem-solving portion of the exams will be open book/open notes, the theoretical, "knowledge assessment" portion of the exams will be completed without book/notes.

Homework/Assignment problems

When using SPSS it is very important that I be able to tell exactly what command you issued to the software. Whenever you are working in SPSS the first thing you should do is make sure that command echoing is turned on. This will include in your output the exact command that was issued to the software. Since for many of the problems in the assignments you will be free to select from a number of possible variables to use,

it is vital that I be able to reproduce the analyses you ran. To turn on command echoing carry out the following steps:

From the menu click Edit -> Options – then select the “viewer” tab and check the box next to “display commands in the log,” then click OK to apply the change. This may have to be done every time you use SPSS on a different computer, if you run a procedure in SPSS and it does not “echo back” the command, be sure to take a minute to do these steps.

Some tips on how to do well in this class

1. Do the reading and problems in the textbook.
2. Do additional problems if you're not obtaining the correct answers.
3. Come and see me during my office hours for help with problems if 1 & 2 have left you confused. When you come to see me for help, be prepared to show me the work you have done on problems and to discuss specifically what it is that you don't understand.
4. Attend class and participate. While attendance is not part of your grade (except to the extent that poor attendance will impact on your participation grade), it is essential if you hope to do well in the course. You are responsible for all information presented in class whether you are present or not.
5. Do the assigned reading prior to class and come prepared to ask and answer questions about the material. This process will help you clarify any points you do not understand, as well as integrating the ideas and concepts you do understand. Active involvement facilitates learning.
6. Study and review problems with other students. Helping others to understand something is an excellent way of increasing our own mastery. Having others to ask about stuff you don't understand can also be a big help.
7. If there are things that you are just not getting despite reading the chapters, working through the problems, attending class and reviewing your notes, please set up an appointment with me or come see me during office hours.

Further Reading/References

- Chow, S. L. (1996). *Statistical Significance: Rationale, Validity, and Utility*. Thousand Oaks, CA: Sage.
- Cohen, J. (1988). *Statistical Power Analysis for the Behavioral Sciences*. (2nd ed.). Hillsdale, NJ: Lawrence Erlbaum.
- Cohen, J., & Cohen, P. (1983). *Applied Multiple Regression/Correlation Analysis for the Behavioral Sciences*. Hillsdale, NJ: Lawrence Erlbaum.
- Grimm, L. G., & Yarnold, P. R. (Eds.). (1995). *Reading and Understanding Multivariate Statistics*. Washington, DC: American Psychological Association.
- Grimm, L. G., & Yarnold, P. R. (Eds.). (2000). *Reading and Understanding MORE Multivariate Statistics*. Washington, DC: American Psychological Association.
- Hays, W. L. (1994). *Statistics*. (5th ed.). New York: Harcourt Brace.
- Keppel, G., & Wickens, T. D. (2004). *Design and Analysis: A Researcher's Handbook* (4th ed.). Upper Saddle River, NJ: Prentice Hall.
- Kline, R. B. (2004). *Beyond Significance Testing: Reforming Data Analysis Methods in Behavioral Research*. Washington, DC: American Psychological Association.
- Rosenthal, R., & Rosnow, R. L. (1991). *Essentials of Behavioral Research: Methods and Data Analysis* (2nd ed.). New York: McGraw Hill.
- Ross, S. M. (1998). *A First Course in Probability*. (5th ed.). Upper Saddle River, NJ: Prentice-Hall.
- Stevens, J. (1996). *Applied Multivariate Statistics for the Social Sciences*. (3rd ed.). Mahwah, NJ: Lawrence Erlbaum Associates.
- Tabachnick, B. G., & Fidell, L. S. (2007). *Experimental Designs Using ANOVA*. Belmont, CA: Duxbury.
- Toothaker, L. E. (1991). *Multiple Comparisons for Researchers*. Newbury Park, CA: Sage.
- Traub, R. E. (1994). *Reliability for the Social Sciences: Theory and Applications*. Thousand Oaks, CA: Sage.