

Psychology 521
Research Design & Analysis I
Th 10-12:30
Fall, 2012

Dr. Tim Otto
Office: 327 Busch Psych
Office Hours: Th 1:30-3
(and by appt).

READINGS: Both of the following books are optional, although highly recommended. I will not be lecturing out of any one book because, to the best of my knowledge, there is currently no one text available that adequately covers each of the topics we will discuss. In addition to readings from these texts, I will be placing on reserve readings from a number of other texts.

R.P. Runyon et al., (2000). *Fundamentals of Behavioral Statistics, 9th Edition*. McGraw Hill. ISBN: 9780072286410

This is the best, clearest statistics text I have seen, and serves as a very handy backup that should serve you well for years to come when a slight refresher, formula, or table is needed. Most of the formulas I will be presenting in class will use notation consistent with this text. It can be purchased used from several vendors on the internet for around \$30 by searching for the ISBN. If you choose to use a stat book that you already own, maybe one you used as an undergrad, that's fine – just be sure that it covers all or most of the topics that appear on the course calendar, and be aware that the formulae may look different.

G.K. Kanji (2006). *100 Statistical Tests*. Sage. ISBN-13: 978-8178297316

This is a must-have compendium of statistical tests, and includes a short description of when/how each is used and every conceivable table you will likely ever need. This short book will be extremely useful to you for years (statistical formulas and concepts rarely change).

COURSE OBJECTIVES: Both the conceptual and technical aspects of experimental research and statistical analysis will be discussed. The major goals of this course are to familiarize students with 1) the theoretical and practical importance of appropriate experimental methodology, 2) the relationship between experimental design and statistical analysis, and 3) the fundamental concepts underlying statistical decision making. This is not a cookbook course on hand calculation. Rather, students will be expected to develop the critical skills necessary for understanding and evaluating research literature and for conducting their own research. The study of statistics is necessarily cumulative, therefore you must keep pace consistently to do well and, more importantly, to develop a thorough understanding of the material.

COURSE REQUIREMENTS AND GRADING: Grades will be based on two take-home exams (a midterm and cumulative final) and one paper. The two exams will each count for 40% of your final grade, and will be composed of short answer and essay questions. The paper, which will account for the remaining 20% of your grade, will consist of a research proposal in the format required by NSF or NIH or, with particular emphasis on experimental design and data analysis.

COURSE CALENDAR AND SUGGESTED READING

- 9/6 Introduction
9/13 Inductive vs. Deductive Logic, Ethics, Philosophical Issues.

Popper, *The Logic of Scientific Discovery*, Chs. 1&2
<http://strangebeautiful.com/other-texts/popper-logic-scientific-discovery.pdf>

Woodward & Goodstein (1996). Conduct, Misconduct, and the Structure of Science, *American Scientist*, 84, 479-490.
<http://www.hum.utah.edu/~bbenham/Phil%207570%20Website/aConduct%20Misconduct%20Science.pdf>

Accidental Discoveries from Nova on PBS
<http://www.pbs.org/wgbh/nova/body/accidental-discoveries.html>

On Reserve:

Keiss & Bloomquist, *Psychological Research Methods*, Chs. 3&4

- 9/20 A review of fundamental statistical issues: Runyon et al.* Chs. 1-7
9/27 One-sample z- and t-tests, Errors: Runyon et al. Chs. 10-12
10/4 NO CLASS
10/11 Two-Sample t-tests: Runyon et al. Ch. 13
10/18 Correlation, Regression, and Prediction: Runyon et al. Chs. 8&9
10/25 Review, tie up loose ends: hand out MIDTERM EXAM (due 11/1)
11/1 One-way ANOVA: Runyon et al. Ch. 14 (Plus discussion of your research proposals)
11/8 Two-Way Anova: Runyon et al. Ch. 15
11/15 Power Analysis, Selecting Sample Sizes. Readings on reserve:
Kraemer & Thiemann, *How Many Subjects? Statistical Power Analysis in Research*, Chs. 2-6.
11/20 NOTE THIS IS A TUESDAY! Nonparametric tests, X^2 : Runyon et al. Chs.17&18
11/29 By this time we will undoubtedly be behind and need to catch up.
12/6 Review, papers due. Hand out FINAL EXAM (due 12/14, 5:00pm)

*: Runyon et al., (2000). *Fundamentals of Behavioral Statistics*, 9th ed., McGraw Hill.