Design and Analysis of Psychological Experiments (Psych 710)

Lecture: Tuesday and Thursday 9:30 - 10:45 am, room 101
Labs: Friday 9:00 - 11:00 am or 1:00 - 3:00 pm, room 106

Professors:

Markus Brauer
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Prerequisites: Grade of BC or better in PSY610

Objectives: This course is the second in a two-course series that focuses primarily on a statistical data analysis procedure called the general linear model. As such, it will cover more advanced topics related to the general linear model including repeated measures, multi-level categorical variables, non-linear (polynomial) effects, and weighted least squares methods. In addition, advanced topics related to the Generalized Linear Model and other analtyic techniques (e.g., exploratory factor analyses), will be covered as well. We will be using the statistics software R. Please know that extensive work outside the classroom is required in order to succeed in this class. We want to encourage you to participate actively in the class, both the lecture and the lab session.

Course Requirements and Grades: Course requirements include regular attendance, active participation in class discussion, and completion of all homework assignments and tests.
Exams will compose 80% of your grade. There will be two closed book exams completed to assess conceptual knowledge. The first of these exams will be completed in class and the second during the final exam period. There will also be three open-book, take-home exams to evaluate application of concepts to brief statistical problems. These will be completed approximately every five weeks.
Lab/homework assignments will comprise the remaining 20% of your grade. The homework assignments will involve hands-on application of the material, mostly involving computer exercises.

Course Email List: **glm@lists.wisc.edu**

Course Website: **http://dionysus.psych.wisc.edu/GLM.htm**

Required Text
Judd, C.M., McClelland, G. H., & Ryan, C. (2007). Data Analysis: A Model-Comparison Approach. New York, US: Harcourt Brace Jovanovich.

Additional Required Readings: Additional required readings will be provided as pdfs on the Lecture Outline and Materials page on the course website. These readings are password protected
password: GLM

Chapters are pulled from various texts and primary sources. Supplemental readings and recommended reference texts are also provided on the course website and the end of this document.

Required Software: This course will contain a significant applied component. As such, access to statistical analysis software is required. In the context of this course, we will rely heavily on R (http://www.r-project.org/). R is freely available and is rapidly become the standard for statistical analysis in many disciplines. Although the goal of this course is NOT to teach you how to use R, you will become quite familiar with this computational platform during the course.

Course Schedule: This schedule and content is provisional so that we may adjust our rate of progress as necessary to ensure maximal mastery of the material. See course website for the most up to date version of the assigned readings and topics.

Unit 21: Introduction to Repeated Measures
Unit 22: Repeated Measures: ANCOVA Approach & Design Issues
Unit 23: Linear Mixed Models
Unit 24: Mediation in repeated measures designs
Unit 25: Case Analysis in Repeated Measures and Linear Mixed Models
Unit 26: Categorical variables w/ > 2 levels
Unit 27: Factorial designs w/ > 2 level categorical variables
Unit 28: Planned and Unplanned Multiple Comparisons
Unit 29: A unified framework for graphing results
Unit 30: TBD
Unit 31: Missing Data
Unit 32: Power and Power analysis
Unit 33: Generalized linear models
Unit 34: Researcher degrees of freedom

Recommended Texts for Data Analysis and Research Methodology:

Abelson, R. P. (1995). *Statistics as Principled Argument*. Hillsdale, NJ: Lawrence Erlbaum Associates.

Aiken, L. S., & West, S. G. (1991). *Multiple Regression: Testing and Interpreting Interactions*. Newbury Park, CA.: Sage.

Chambers, J (2008). Software for Data Analysis: Programming with R. New York: Springer Science Business Media.

Cook, T. D., & Campbell, D. T. (1979). *Quasi-Experimentation - Design and Analysis Issues for Field Settings*. Boston, MA: Houghton Mifflin Company.

Cohen, J., Cohen, P., West, S. G., & Aiken,, L. S. (2003). *Applied Multiple Regression/Correlation Analysis for the Behavioral Sciences* (3rd. Ed.). Mahwah, NJ: Lawrence Erlbaum Associates.

Dalgaard, P. (2008) Introductory Statistics with R (2nd edition). New York: Springer Science Business Media.

Fox, J. (2008). Applied Regression, Generalized Linear Models, and Related Methods, Second Edition. Sage Publications.

Fox, J & Weisberg, S (2010). *An R Companion to Applied Regression* (2nd Edition). Sage Publications.

Hoyle, R. H., Harris, M. J., & Judd, C. M. (2006). *Research Methods in Social Relations*. Belmont, CA, US: Allyn & Bacon. (no need to buy this book)

Judd, C. M., & Kenny, D. A. (1981). *Estimating the Effects of Social Interventions*. New York, NY: Cambridge University Press.

Kutner, M., Nachtscheim, C., & Neter, J (2004). Applied Linear Regression Models, Fourth edition, McGraw-Hill.

Reis, H. T., & Judd, C. M. (2000). *Handbook of Research Methods in Social and Personality Social Psychology*. New York, NY: Cambridge University Press.

Tabachnick, B. G., & Fidell, L. S. (2012). *Using Multivariate Statistics* (6th edition). New York, NY: Harper Collins.

Where to take complaints about a Teaching Assistant or Course Instructor: Occasionally, a student may have a complaint about a Teaching Assistant or course instructor. If that happens, you should feel free to discuss the matter directly with the TA or instructor. If the complaint is about the TA and you do not feel comfortable discussing it with him or her, you should discuss it with the course instructor. If you do not want to approach the instructor, make an appointment to speak to the Department Chair, Professor Patricia Devine: chair@psych.wisc.edu.

If your complaint has to do with sexual harassment, you may also take your complaint to Vicky Lenzlinger, Instructional Program Manager, vlenzlinger@psych.wisc.edu. Her office is located on the second floor of the Psychology building, room 222.

If you believe the TA or course instructor has discriminated against you because of your religion, race, gender, sexual orientation, or ethnic background, you also may take your complaint to the Office of Equity and Diversity, room 179-A Bascom Hall, or go to: http://www.oed.wisc.edu

Ethics of being a student in the Department of Psychology: The members of the faculty of the Department of Psychology at UW-Madison uphold the highest ethical standards of teaching and research. They expect their students to uphold the same standards of ethical conduct. By registering for this course, you are implicitly agreeing to conduct yourself with the utmost integrity throughout the semester.
In the Department of Psychology, acts of academic misconduct are taken very seriously. Such acts diminish the educational experience for all involved – students who commit the acts, classmates who would never consider engaging in such behaviors, and instructors. Academic misconduct includes, but is not limited to, cheating on assignments and exams, stealing exams, sabotaging the work of classmates, submitting fraudulent data, plagiarizing the work of classmates or published and/or online sources, acquiring previously written papers and submitting them (altered or unaltered) for course assignments, collaborating with classmates when such collaboration is not authorized, and assisting fellow students in acts of misconduct. Students who have knowledge that classmates have engaged in academic misconduct should report this to the instructor.

For detailed information on how to avoid plagiarism, please see the following website:
http://writing.wisc.edu/Handbook/QuotingSources.html

Your instructor will contact you if he has concerns about academic misconduct. You will have an opportunity to explain your work and address your instructor's concerns. Following the meeting, if your instructor believes that you engaged in misconduct, s/he will decide on an action. Following UW protocol, your instructor will inform the Dean of Students' Office of the outcome of the meeting and proposed sanction. Penalties for substantiated cases of academic misconduct include a zero on the assignment or exam, a lower grade in the course, and failure in the course. Repeated acts of academic misconduct may result in more serious actions such as probation or suspension. For complete information on proper conduct, academic misconduct, and sanctions, please see UWS Chapter 14:
http://students.wisc.edu/saja/misconduct/UWS14.html