2017-09-06

Statistical Analysis of Psychological Experiments (Psych 610)
Fall 2017

Lecture: Tuesday and Thursday 9:30-10:45 am, Room 101
Labs: Friday 9:00 - 11:00 am (section 301) or 1:00 – 3:00 pm (section 302), Room 228 (Psychology)

Professor:
John Curtin
E-Mail: jjcurtin@wisc.edu
Office hours: Thurs 2 – 3 pm, or by appt
Room 326 (Psychology)

Teaching Assistants:
Daniel Bradford
E-mail: dbradford@wisc.edu
Office hours: Th 11 – 12 pm, or by appt
Room: 325 (Psychology)

Mitchell Campbell
E-mail: mcampbell9@wisc.edu
Office Hours: We 10:45-11:45a m, or by appt
Room: 438B (Psychology)

Objectives: The goal of this class is to familiarize you with a statistical data analysis procedure called the general linear model. After a short introduction on reliability and validity, we will spend most of the semester on regression analysis as a tool for analyzing data from psychological experiments. We will give special attention to the interpretation of regression coefficients, regression models with continuous and categorical predictors, and the interpretation of interaction effects in regression analysis. We will be using the statistics software R (http://www.r-project.org/). 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.

Final Exam Date/Time: Thursday, Dec 21, 12:25 – 2:25 pm

Course Email List: 610@lists.wisc.edu

Course Website: http://dionysus.psych.wisc.edu/610.htm

Required Text
Judd, C.M., McClelland, G. H., & Ryan, C. (2017). Data Analysis: A Model Comparison Approach to Regression, ANOVA, and Beyond, Third Edition. New York, US: Routledge.

Additional Required & Supplemental Readings: Additional required readings will be provided as pdfs on the Lecture Outline and Materials page on the course website. 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.

Course Schedule: This schedule 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.

1) Introduction to inferential statistics (1 day)
2) Sampling Distributions (1 day)
3) Inferences about a single mean (one-sample t test) (1 day)
4) Inferences about a single continuous predictor (simple regression) (2 days)
5) Inferences about a single dichotomous predictor (independent-samples t test) (1 day)
6) Inferences about two predictors (multiple regression without interaction) (2 days)
7) Inferences about 3 or more predictors (multiple regression without interactions) (1 day)
8) Dealing with messy data I – case analysis (1 day)
9) Dealing with messy data II – model assumptions (1 day)
10) Dealing with messy data III – transformations (1 day)

-) Review Session (Outside of class; Date: TBD)
-) In-class Exam 1: Thursday 10/19/2017

11) Inferences about two continuous predictors and their interaction (2 days)
12) Inferences about a continuous and dichtomos predictor and their interaction (1 days)
13) Inferences about two dichotomous predictors and their interaction (= 2 x 2 ANOVA) (1 day)
14) Mediation (1 days)

-) Thanksgiving break

15) Catergorical variables w/ > 2 levels (2 days)
16) Planned and unplanned contrasts (1 day)
17) Repeated measures: Design and analysis options (4 days)
18) Power and Power Analysis (1 day)
19) Transparency and reproducibility in science (1 day)

-) Review Session (Outside of class; Date: TBD)
-) Final exam on 12/21/2017, 12:25 – 2:25 pm

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. (2006). *Using Multivariate Statistics* (5th edition). New York, NY: Harper Collins.

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.

Complaints:

Occasionally, a student may have a complaint about a TA 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. Complaints about mistakes in grading should be resolved with the TA and/or instructor in the great majority of cases. If the complaint is about the instructor (other than ordinary grading questions) and you do not feel comfortable discussing it with him or her, make an appointment to speak to the Chair of The Psychology Department, Professor Hill Goldsmith (hill.goldsmith@wisc.edu).
If your complaint concerns sexual harassment, you may also take your complaint to Dr. Linnea Burk, Clinical Associate Professor and Director, Psychology Research and Training Clinic, Room 315 Psychology (262-9079; burk@wisc.edu).
If you believe the TA or course instructor has discriminated against you because of your religion, race, gender, sexual orientation, disability, or ethnic background, you may talk to the Associate Chair or the Department Chair, or you may file a formal complaint with an Equal Opportunity Complaint Investigator in the UW-Madison Office of Compliance, Room 361 Bascom Hall, 608-265-6018 (https://compliance.wisc.edu/eo-complaint/)

Accommodations Policy:

The University of Wisconsin-Madison supports the right of all enrolled students to a full and equal educational opportunity. The Americans with Disabilities Act (ADA), Wisconsin State Statute (36.12), and UW-Madison policy (Faculty Document 1071) require that students with disabilities be reasonably accommodated in instruction and campus life. Reasonable accommodations for students with disabilities is a shared faculty and student responsibility. Students are expected to inform faculty [me] of their need for instructional accommodations by the end of the third week of the semester, or as soon as possible after a disability has been incurred or recognized. Faculty [I], will work either directly with the student [you] or in coordination with the McBurney Center to identify and provide reasonable instructional accommodations. Disability information, including instructional accommodations, as part of a student's educational record is confidential and protected under FERPA.