Political Science 231A — Spring 2009
Quantitative Analysis in Political Research — Lecture: Tu/Th 9:30-11, 2304 Tolman Hall
Section: Fri 10-11, 2505 Tolman Hall
Fri 11-12, 1525 Tolman Hall

Professor Jason Wittenberg
732 Barrows Hall
Office Hours: Wed 10-12pm & by appointment
witty@berkeley.edu

GSI: Taylor Boas
Tu/Th 12-1
tboas@berkeley.edu

Quantitative Analysis in Political Research

Purpose: This introductory course in quantitative analysis provides graduate students in the social sciences with tools necessary for conducting and understanding empirical research. The most important of these tools is statistics, the science of collecting, analyzing, and extracting useful information from data. We will learn how to characterize samples of data, and then use probability to infer much broader conclusions about the world. Along the way we will learn about probability distributions, expectations, the logic of hypothesis testing, and the regression model. Many of the examples we will consider are not obviously "political", but the principles of inference you learn will be indispensable in your further studies.

Prerequisites: This is not a "statistics for poets" course. Students will be expected to understand and perform arithmetic, algebra, basic calculus, and elementary data analysis on a computer. If you need extra help with these please see me or Taylor. The material in this course is cumulative, each week building on the previous one. Consequently, if you fall behind it may be very difficult to catch up. Therefore it is very important that you understand the concepts presented both in the book and in lecture. **Don't be afraid to ask questions in lecture or in the discussion section!**

Requirements: There will be almost weekly problem sets, which will be assigned on a Tuesday, and are due the following Tuesday in class. Please be kind to Taylor by being tidy and timely with your homework. Together the problem sets will account for 20% of the final grade. You may work on these collaboratively (in groups of no more than 3), but be sure you understand the material, or the exams will prove difficult. There will be two mid-term exams, each counting for 20% of the grade, and one final exam (40%). These exams will be closed-book, though you will be permitted to bring in one standard-size (8.5x11in) review sheet. You will also need a hand calculator for homework and exams.

Software: Some of the homework will involve use of R, a popular open-source statistics package. To help you learn R we have reserved the microcomputer lab in 1535 Tolman Hall every Friday from 11-12. The idea is to devote the first hour of section 2505 Tolman Hall) to going over the statistical material for the week, and to spend the second hour learning R. You should also install R on your laptops. It is available at http://cran.r-project.org/.

There are two textbooks for this course, available at the ASUC and/or Ned's, both near the corner of Bancroft and Telegraph:

Richard J. Larsen and Morris L. Marx, *An Introduction to Mathematical Statistics and Its Applications*. Fourth Edition. (Upper Saddle River, NJ: Prentice Hall, 2006).
Peter Dalgaard, *Introductory Statistics with R*. Second Edition. (New York: Springer, 2008).

Larsen and Marx is somewhat mathematical, so if you feel like you want a less technical take, here are two other popular textbooks (there are dozens of similar ones):

William Mendenhall, Robert J. Beaver, and Barbara M. Beaver, *Introduction to Probability and Statistics*. (Duxbury Press, 1999).
David S. Moore and George P. McCabe, *Introduction to the Practice of Statistics*. (W.H. Freeman and Company, 2003).
Thomas H. Wonnacott and Ronald J. Wonnacott, *Introductory Statistics for Business and Economics*. (John Wiley & Sons, 1990).

Note: New and better readings often come to my attention. I reserve the right to add or subtract material as needed.

Tentative Course Schedule (There is some flexibility here depending on how we progress.)

Week 1, Jan 20-22: Taking a Chance with Probability

- Christopher H. Achen, "Advice for Students Taking a First Political Science Graduate Course in Statistical Methods," *The Political Methodologist*, Vol. 10, No. 2, Spring 2002, pp. 10-12.
- R.P. Cuzzort and James S. Vrettos, *The Elementary Forms of Statistical Reason*. (New York: St. Martin's, 1996), pp. 7-33.
- Larsen and Marx, §2-1-§2.5.

Week 2, Jan 27-29: Taking an RV Out for a Spin (Random Variables and Expectation)

- Larsen and Marx, §3.1, §3.3, §3.4, §3.5 (skip Example and Theorem 3.5.2), §3.6 (only through p. 199); §3.9 though the top of p. 237.

Week 3, Feb 3-5: Discrete Probability Distributions

- Larsen and Marx, §3.2 (Binomial only), §4.1, §4.2 through p. 289.

Week 4, Feb 10-12: Continuous Probability Distributions and the Central Limit Theorem

- Larsen and Marx, §4.3.
- Donald E. Stokes, "Party Loyalty and the Likelihood of Deviating Elections," *The Journal of Politics*, Vol. 24, No. 4, Nov. 1962, pp. 689-702. (JSTOR)

Week 5, Feb 17: Probability Applications
Week 5, Feb 19: Midterm Exam

Week 6, Feb 24-26: Estimation: Confidence and Significance

- Larsen and Marx, §5.1, §5.3, Examples 5.4.3 and 5.4.4, the bottom part of p. 388, Example 5.4.6, and §6.1-§6.2.

Week 7, Mar 3-5: Estimation: Power and Error

- Larsen and Marx, §6.4 (skip the "Power Curves" section and everything beginning with "Decision Rules for Nonnormal Data").

Week 8, Mar 10-12: Inferences for Means

- Larsen and Marx, §7.1-§7.2; §7.4 through p. 493; §9.2.

Week 9, Mar 17: Inferences for Tabular Data

- Larsen and Marx, §10.5 (skip the "Testing for Independence: the General Case" and continue with Case Study 10.5.1).
- Edward D. Mansfield and Jack Snyder, "Democratization and the Danger of War," *International Security*, Vol. 20, No. 1, Summer 1995, pp. 5-38. (JSTOR)

Week 9, Mar 19: Midterm Exam

Week 10, Mar 24-26: Spring Break

Week 11, Mar 31-Apr 2: Bivariate Regression

- Larsen and Marx, §11.1, §11.2 (through p. 662), §11.3, §11.4
- Thomas H. Wonnacott and Ronald J. Wonnacott, *Introductory Statistics for Business and Economics*. (John Wiley & Sons, 1990), Chapters 11-12.
- Jeffrey A. Segal and Albert D. Cover, "Ideological Values and the Votes of U.S. Supreme Court Justices," *American Political Science Review*, Vol. 83, No. 2, June 1989, pp. 557-565. (JSTOR)
- Edward R. Tufte, "The Relationship between Seats and Votes in Two-Party Systems," *American Political Science Review*, Vol. 67, No. 2, June 1973, pp. 540-554. (JSTOR)

Week 12, Apr 7-9: Introduction to Multiple Regression

- John Neter et al., *Applied Linear Regression Models*. (Richard D. Irwin, Inc., 1983), Chapter on "Matrix approach to simple regression analysis," but skip material on weighted least squares.

- Wonnacott and Wonnacott, §13-1-§13-5.
- David A. Freedman, *Statistical Models: Theory and Practice*. (Cambridge University Press, 2005), Ch. 4 on "Multivariate Regression."

Weeks 13-15, Apr 14-30: Topics in Regression Analysis (Tentative)

- Model Specification
  - Christopher H. Achen, *Interpreting and Using Regression*. (Sage, 1982), pp. 51-68.
  - William D. Berry, *Understanding Regression Assumptions*. (Sage, 1993), pp. 30-41.
  - Damodar N. Gujarati, *Basic Econometrics*. Fourth Edition. (McGraw Hill, 2007), Chapter 13 through the middle of p. 528; §13.9, §13.12-§13.13.

- Measurement Error
  - William D. Berry and Stanley Feldman, *Multiple Regression in Practice*. (Sage, 1985), pp. 26-37.
  - Gujarati, §13.5.

- Multicollinearity
  - Berry and Feldman, pp. 37-50.
  - Gujarati, Chapter 10.

Week 16, May 5: Extra Office Hours
Week 16, May 7: Final Exam