

PSC 522-001
Quantitative Methodology in Political Science I

Spring 2012
12:30-1:45, Tuesday & Thursday
354 ten Hour Hall

Professor George Hawley
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Office hours: TTh 10-11:30am

Course Description

This course is a first graduate course for political methodology. Main goal for the semester is to understand the *logic* of statistics and statistical modeling. In addition, by studying the Ordinary Least Squared (OLS) method, students will be *ready* for learning more specific models in Quant II. The topics that we will intensively discuss include: 1) probability theory; 2) mathematical statistics; 3) linear regression model; and 4) statistical software R.

Prerequisites

Students should have taken PSC 521 (Research Design) or, at least, be familiar with materials covered in this course.

Course Objectives

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

- 1) Understand key concepts on probability theory and mathematical statistics, such as
 - a. Random variable, probability distributions, and independence
 - b. Populations, parameters, and random sampling
 - c. Confidence interval and hypothesis testing;
- 2) Apply these concepts in R;
- 3) Describe the logic of Ordinary Least Squared (OLS) method;
- 4) Run linear regression models in R; and
- 5) Interpret the linear regression results.

Textbooks and Additional Materials

The following two books are *required* textbooks:

- John Verzani. 2004 *Using R for Introductory Statistics*. Chapman&Hall/CRC.
- John Fox. 2008. *Applied Regression Analysis, Linear Models, and Related Methods*. 2nd ed. Thousand Oaks: Sage Publications.

The following book is *recommended* in order to help students better understand the materials covered both in the classroom and in the main textbooks.

- John Fox and Sanford Weisberg. 2011. *An R Companion to Applied Regression*. 2nd ed. Thousand Oaks: Sage Publications.

Course Requirements and Grading

Each time we meet in the classroom, Professor Hawley will give a lecture on the week's topic, during which we will intensively use R under a lab-like setting. So, make sure that you bring your *laptop computer* to class (see Professor Hawley immediately for an alternative arrangement).

Ultimately, the final course grading will be based upon three parts:

- 1) Problem Sets (50%): When learning statistics, it is essential to do extensive reviews (rather than previews). 10 weekly problem sets will help students on this. Make sure that you submit your answers accompanied by R codes.
- 2) Final Exam (40%): There will be a test at the end of the semester. It will be primarily a closed-book exam, but students will be allowed to bring ONE piece of paper, on which important information should be *hand-written* (use only one side).
- 3) Class Participation (10%): Even though this course is largely lecture-based, we learn from discussions. Note that *quality* is more important than quantity in general.

Students who take this course under the Pass/Fail option must receive a grade of C or better in order to obtain a Pass on their final grade. A final grade of "Incomplete" will only be given under exceptional circumstances and is solely at the discretion of Professor Hawley.

As a general rule, make-ups for any course requirements will not be given. Students who miss any requirements because of scheduled activities of an official University student organization, a religious holiday, or a verifiable illness should contact Professor Hawley *in advance* so that alternative arrangements can be made.

If there is a dispute regarding a grade, re-grading is possible under two conditions:

- All grade complaints must be typed and must clearly express specific concerns. These written statements must be accompanied by citations of support from course materials, i.e. readings, textbooks, and/or lecture notes, in order to ensure accuracy.
- The entire part, not just the section under dispute, must be subject to re-grading (by another faculty member in the Political Science department). Thus, it is very possible that a lower grade could eventually result.

Classroom Policies and Instructor Availability

I expect all students to behave professionally in this course. I am intolerant of disruptive behavior in the classroom, including talking during lectures, reading newspapers, and especially the ringing of cell phones or pagers. Laptops may be used for professional purposes, but not for playing games or surfing the Internet. Students engaging in disruptive behavior will be asked to leave the classroom in order to preserve the learning environment for other students. Class discussions are expected to be civil, rational, and respectful of others' opinions. Please do not intimidate, patronize, or ridicule anyone else during the course of classroom activities.

If students would like to speak with me outside of class time, feel free to stop by my office (306 ten Hoor Hall) during regularly scheduled office hours (Tuesdays and Thursdays 10-11am). If students are unable to attend office hours, but would like to meet with me, please contact me via email (ghawley@as.ua.edu) to arrange an appointment. I am typically quick to respond to such emails. I, unfortunately, cannot guarantee that I will be able to meet with students that come to my office without first scheduling a time to see me.

Academic Integrity

No form of academic dishonesty will be tolerated. The University of Alabama has detailed its policies on academic integrity (<http://www.studenthandbook.ua.edu/conduct.html>). Students should acquaint themselves with policies concerning cheating, fabrication, plagiarism, and academic interference. Any submission of work by a student in this course constitutes a certificate that the work complies with university policies on academic integrity.

Student Disabilities

Any student with disabilities of any kind (e.g. physical, learning, psychiatric, systemic, vision, hearing, etc.) who needs to arrange reasonable accommodations should contact the Professor Hawley and the Office of Disability Services at the beginning of the semester.

Tentative Schedule

Below is a tentative schedule for the semester. Professor Hawley reserves the rights to alter the reading, homework assignments, and test date in a timely fashion according to the progress of the class. **R** indicates the Verzani (2004) book, and **Fox** indicates the Fox (2008) book.

Time	Topic	Reading	Assignments
Week 1 (1/9)	Introduction	Fox 1	
Week 2 (1/15, 1/6)	1. Random variable and probability distributions 2. Joint and conditional distributions, and independence 3. Introduction to R and LaTeX	R 1	PS 1
Week 3 (1/21, 1/23)	1. Mean and median 2. Variance and standard deviance	R 2, 3	PS 2
Week 4 (1/28, 1/30)	1. Graphics in R 2. Covariance and correlation 3. Conditional expectation	R 2, 3	PS 3
Week 5 (2/4, 2/6)	1. Normal distribution 2. χ^2 , t , and F distributions	R 4, 5.2	PS 4
Week 6 (2/11, 2/13)	1. Populations, parameters 2. Random sampling 3. Bias and efficiency	R 5.1, 6.2, 6.4	PS-Bonus
Week 7 (2/18, 2/20)	1. Consistency 2. Central limit theorem (CLT) 3. Confidence interval	R 5.3, 7	PS 5
Week 8 (2/25, 2/27)	1. Hypothesis testing 2. T-test and Prop-test	R 8	PS 6
Week 9 (3/4, 3/6)	1. Review of PS 1-5 2. OLS: Simple regression model	Fox 5	PS 7
Week 11 (3/11, 3/14)	1. OLS: Multivariate regression model 2. Gauss-Markov theorem	Fox 5, 9	PS 8
Week 12 (3/18, 3/20)	OLS: Statistical inference	Fox 6	PS 9
Week 13 (3/31)	Dummy variables and interactions	Fox 7	PS 10
Week 15 (4/8, 4/10)	1. Introduction to GLM models 2. Instrumental variable	TBD	Exercise*
Week 16 (4/15, 4/17)	1. Review of PS 6-10 2. Data management in R and Wrap-up		
Week 17 (4/22)	Final Remarks and Overview		
Week 18	Final Exam		

Note: * This exercise will be distributed only for the study purpose, not for the grading purpose.