

# WWS 507B: Quantitative Analysis

Woodrow Wilson School  
Princeton University  
Fall 2007

Instructor: Sam Schulhofer-Wohl, [sschulho@princeton.edu](mailto:sschulho@princeton.edu)  
Preceptor: Dean Spears, [dspears@princeton.edu](mailto:dspears@princeton.edu)

All course materials will be posted on the class Web page at [blackboard.princeton.edu](http://blackboard.princeton.edu).

## 1 Class times and office hours

**Regular lecture time:** 9 to 10:30 a.m. Tuesdays and Thursdays in Robertson 001.

**Rescheduled lectures:** This class will meet from 7:30 to 9 p.m. Sept. 18 and from 4:30 to 6 p.m. Sept. 20, rather than at the regular time on those days, so you can also try the first week of WWS 507C. There will be no class Nov. 8. There will be one makeup class, time TBA.

**Precepts:** TBA.

**Sam's office hours:** 2 to 4 p.m. Thursdays in Wallace 363, or by appointment.

**Dean's office hours:** TBA.

## 2 Course description

This course is an introduction to empirical methods commonly used in analyzing public policy. We will discuss how social scientists – especially economists – combine statistical tools and economic theory to answer questions about the world.

**Example:** Does sending nonviolent criminals to prison (instead of, say, putting them on probation) create a stigma that will reduce their chances of finding legitimate work when they are released? Can we answer this question by taking a national survey of former inmates and people who have never been to prison, and comparing their unemployment rates?

**Objectives:** By the end of the course, you should be able to perform basic empirical analyses and critically evaluate and explain basic empirical work done by other people.

**Prerequisites:** This course requires no background in statistics and only basic familiarity with calculus concepts. Students who are proficient in calculus may prefer WWS 507C. Please see me or Professor Mark Watson, the instructor for WWS 507C, if you have questions about which course is appropriate for you.

### 3 Grading and policies

**Final exam:** 35%. Date and time TBA. Closed book/notes.

**Midterm:** 20%. Take-home: You may complete the exam during any consecutive four-hour period between Oct. 25 and Nov. 6; due at the start of class Nov. 6. Closed book/notes.

**Projects:** 30%. Project 1: distributed Oct. 25, due at the beginning of class November 20. Project 2: distributed December 4, due at 5 p.m. January 15. You may work with classmates on the statistical analysis but must write up your own reports.

**Problem sets:** 15%. About eight, due at the beginning of class most Thursdays. You may work with classmates but must write up your own answers.

I will not accept late work except in cases of medical or family emergency. If you require accommodations for a disability, please see me as soon as possible.

### 4 Readings

The following recommended books are on reserve at Stokes Library:

- Ashenfelter, Orley, Phillip B. Levine and David J. Zimmerman, 2003, *Statistics and Econometrics: Methods and Applications*, John Wiley & Sons.
- Stock, James H., and Mark W. Watson, 2007, *Introduction to Econometrics*, second edition, Addison-Wesley.
- Huff, Darrell, 1954, *How to Lie with Statistics*, W.W. Norton.

Ashenfelter et al. and Stock and Watson are textbooks; you will probably want to buy one, but there is no need to buy both, so examine the books on reserve and choose whichever you find more helpful. Huff is a brief, entertaining and non-mathematical overview of most of the important topics in the first half of the course; it's worth reading early in the semester. You will be tested on material in the books only if we also cover it in class or on an assignment.

I will assign other readings from time to time.

### 5 Course outline

Chapter numbers refer to Ashenfelter et al. (ALZ) and Stock and Watson (SW).

1. Motivation and descriptive statistics.
  - a. Introduction. ALZ 1; SW 1.
  - b. Measures of central tendency, dispersion and association. ALZ A.3.

2. Probability and random variables.
  - a. Probability theory. ALZ 2, A.2.
  - b. Random variables. Distributions. ALZ 3, 5.1-5.4, A.2, A.4; SW 2.1, 2.3, 2.4.
  - c. Expectations, variances and covariances. ALZ 4, 5.5-5.8; SW 2.2, 2.3.
3. Random sampling and sampling distributions.
  - a. Data collection. ALZ 6.1-6.4; SW 2.5.
  - b. Estimation theory. Estimation of means and variances. ALZ 6.5, 7.
  - c. Distribution of the sample mean. Law of large numbers. Central limit theorem. ALZ 6.6-6.10, A.5, A.7; SW 2.5, 2.6, 3.1.
4. Statistical inference.
  - a. Hypothesis testing. ALZ 8.3, A.6; SW 3.2.
  - b. Confidence intervals. ALZ 8.2; SW 3.3.
  - c. Bayesian inference. ALZ 2.6.
  - d. Comparing two populations. Randomized experiments. SW 3.4, 11.1-11.2.
5. Simple regression.
  - a. Mechanics. ALZ 9, 10.6; SW 4.1-4.2, 4.8.
  - b. Assumptions of the classical linear regression model. Unbiasedness. Inference. ALZ 10.1-10.5, 10.7; SW 4.3-4.6, 4.9.
6. Multiple regression.
  - a. Omitted variable bias. ALZ 13.1-13.3; SW 5.1.
  - b. Mechanics. ALZ 11.1-11.5; SW 5.2, 5.3, 5.10, 5.11.
  - c. Inference. ALZ 11.6, 12.3, 14.2; SW 5.5-5.9.
  - d. Logs, quadratics, categorical and dummy variables, interactions. ALZ 12.1, 12.2, 13.4; SW 6.
  - e. Binary dependent variables. ALZ 16; SW 9.
  - f. Interpreting regression results. SW 7.