

# **POLS/CSSS 503:**

## **Advanced Quantitative Political Methodology**

Instructor: Chris Adolph, Associate Professor, Political Science and CSSS

Spring Quarter 2014  
University of Washington

### **Class Meets**

Tuesdays, 4:30–7:20 PM  
Electrical Engineering 031

### **Office**

145 Gowen Hall  
cadolph@uw.edu

### **Section Meets**

Friday, 1:30–3:20 PM  
Savery 117

### **Teaching Assistant**

Carolina Johnson  
csjohns@uw.edu

**Overview and Class Goals.** This course continues the graduate sequence in quantitative political methodology, focused particularly on fitting, interpreting, and refining the linear regression model. Our agenda includes gaining familiarity with statistical programming via the popular R environment, developing clear and informative graphical representations of regression results, and understanding regression models in matrix form. More advanced topics, likely including time series, panel data, and causal inference, will be covered as time and student interests permit.

**Prerequisites.** It is desirable for students to have taken the introductory course in the sequence (Political Science 501), but any prior course on basic social statistics and linear regression should suffice.

**Course Requirements.** Course evaluation will be based on problem sets (given weekly or biweekly) and a final paper (due Monday, 9 June, at 3 PM). You may discuss the problem sets with other students (and should note any such collaborators on your write-up), but the computer code, results, and write-up must be your own. The final paper should be a 15–20 page report on an original quantitative analysis or replication-and-extension of a published article. Students may work in pairs on the final paper with instructor permission.

**Office Hours.** Chris Adolph: Wednesdays, 10:30 AM–Noon, and by appointment.  
Carolina Johnson: Tuesday 2:30 PM–4:20 PM in Gowen 32.

**Course Website.** Consult <http://faculty.washington.edu/cadolph/503> for problem sets, notes, and announcements. A mailing list will also be made available for class discussion and homework help.

## Course readings

Required books, available on Amazon.

Andrew Gelman and Jennifer Hill. 2007. *Data Analysis Using Regression and Multi-level/Hierarchical Models*. Cambridge University Press. (Amazon: \$49.48)

John Fox. 2008. *Applied Regression Analysis and Generalized Linear Models*. Sage Publications. 2nd Ed. (Amazon: \$104.98)

Alain F. Zuur, Elena N. Ieno, and Erik H.W.G. Meesters. 2009. *A Beginner's Guide to R*. Springer. (Amazon: \$48.04)

Optional books, available through library or Amazon.

*Level of difficulty:* \*Gentle ( $\approx$  Gelman & Hill or Fox), \*\*Intermediate, \*\*\* Advanced.

\*\*\*Russell Davidson and James G. MacKinnon. 1993. *Estimation and Inference in Econometrics*. Oxford. Worth study after 503 to understand linear regression at a deep level.

\*\*Jeffrey Wooldridge. 2010. *Econometric Analysis of Cross Section and Panel Data* 2nd Ed. MIT Press. Especially strong on instrumental variables and panel data estimators, from an econometric perspective.

\*\*William H. Greene. 2007. *Econometric Analysis* Prentice Hall. 6th ed. 2007. Un-matched for breadth as a reference.

\*\*W.N. Venables and B. D. Ripley. 2002. *Modern Applied Statistics with S*, New York: Springer-Verlag. 4th Ed. Unique combination statistics text and computer manual, but assumes you already know some statistics and some R.

\*Damodar N. Gujarati and Dawn Porter. 2008. *Basic Econometrics*. McGraw Hill. 5th Ed. Useful as an alternative to Fox.

\*Paul S.P. Cowpertwait and Andrew V. Metcalfe. 2009. *Introductory Time Series with R*. Springer. A gentle introduction to basic time series concepts.

\*Joshua D. Angrist and Jörn-Steffen Pischke. 2008. *Mostly Harmless Econometrics: An empiricist's companion*. Princeton University Press. Hands-on, fun, but controversial introduction to instrumental variables and related techniques from a labor economics perspective.

Required articles, available online.

Nathaniel Beck and Jonathan Katz. 1995. "What to do (and not to do) with time-series cross section data." *American Political Science Review*. Available through UW library.

Thomas Brambor, William Roberts Clark, and Matt Golder. 2005. "Understanding Interaction Models: Improving Empirical Analyses." *Political Analysis* May. Available through UW library.

Andrew Gelman, Cristian Pasarica, Rahul Dodhia. 2002. "Let's practice what we preach: Turning tables into graphs." *The American Statistician*. May. 56:2. 121-130. Available through UW library.

Gary King. 1986. "How not to lie with Statistics. Avoiding Common Mistakes in quantitative political science." *American Journal of Political Science* August. 666-687. <http://gking.harvard.edu/files/mist.pdf>

Gary King, Michael Tomz, and Jason Wittenberg. 2000. "Making the Most of Statistical Analyses: Interpretation and Presentation" *American Journal of Political Science* 44(2) 341–355. Available through UW library.

## Course outline

The following outline of topics is a guideline, and may be altered to meet course needs. In particular, the pace of the course may vary to make sure we are moving as fast as possible conditional on everyone "getting" the material. Students should come to class having read the material for the "next" topic to be covered, unless otherwise instructed. \* indicates topics we will cover as time allows.

### Part 1. Introductory matters

Tuesday, 1 April · Introduction to 503 & to R / Matrix Algebra Review

*Readings:* Gelman and Hill, Ch. 2.

Matrix Algebra handout

Math review: [www.csss.washington.edu/MathCamp/Lecture/](http://www.csss.washington.edu/MathCamp/Lecture/)

Basic regression review: Fox, Ch. 2, 3

### Part 2. Building and understanding the linear regression model

Tuesday, 8 April · Assumptions & Properties of the Linear Regression Model, Part 1

*Readings:* Zuur, Ch. 1, 2, 3

Fox, Ch. 5, 6, and skim 9

Tuesday, 15 April · Assumptions & Properties of the Linear Regression Model, Part 2

*Readings:* Fox, Ch. 9 carefully

Zuur, Ch. 5

**PROBLEM SET I DUE IN CLASS TUESDAY, 15 APRIL**

Tuesday, 22 April · Statistical Inference / Interpretation of the Linear Model

*Readings:* Zuur, Ch. 4, 6  
Gelman and Hill, Ch. 3  
King, Tomz, and Wittenberg (2000)  
Brambor, Clark, and Golder (2005)

**PROBLEM SET 2 DUE IN SECTION FRIDAY, 25 APRIL**

Tuesday, 29 April · Model Fitting & Data Transformation

*Readings:* Gelman and Hill, Ch. 4, and optionally Ch. 7  
Fox, Ch. 12, 13, 17.1–17.2

Tuesday, 6 May · Outliers & Robust Regression

*Readings:* Fox, Ch. 11, 19  
Venables & Ripley, Ch. 6.5

**PROBLEM SET 3 DUE IN CLASS TUESDAY, 6 MAY**

Part 3. Advanced topics in linear regression

Tuesday, 13 May – Tuesday 20 May · Introduction to Time Series Analysis

*Readings:* Cowperthwait & Metcalfe, Ch. 1–2, 4–5, 6–7  
Fox, Ch. 16 (optional)  
Gelman and Hill, Ch. 8 (optional)

**PROBLEM SET 4 DUE IN CLASS TUESDAY, 20 MAY**

Tuesday, 27 May · Panel Data Analysis\*

*Readings:* Woolridge, Ch. 10  
Beck and Katz (1995)

Tuesday, 3 June · Introduction to Causal Inference\*

*Readings:* Gelman and Hill, Ch. 9  
*Recommended:* Angrist and Pischke  
Woolridge, Ch. 5

**PROBLEM SET 5 DUE IN CLASS TUESDAY, 3 JUNE**

**FINAL PAPER DUE AT 3 PM ON MONDAY, 9 JUNE IN MY GOWEN HALL MAILBOX**