

**POLS 603**  
**Quantitative Political Analysis II**  
**Summer 2005**

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The main purpose of this class is to provide the student with a mastery of the basic regression model—understanding both the statistical theory behind its use in political science and a deep understanding for application to your own work. My assumption is that what happens to be in vogue in political methodology will change rapidly and, more importantly, that the methods you will need in your own research will lead you in unpredictable directions that cannot be anticipated in this class. Mastery of the underlying statistical theory behind regression will provide the background necessary to quickly master new applications as you need them.

To that end, the class starts with an introduction to statistical, probability, and distributional theory. In many ways, this may be the most important portion of the class. I do not believe you need to know this material at the top of your head (I certainly do not), but it is important that you understand how to read works that use this theory and know where to look to understand what is occurring “behind the scenes” of our statistical models. Then the course moves to a mathematical introduction of the general linear regression model and some of its numerous extensions.

The textbook for this course is William Greene’s *Econometric Analysis*. This can be a difficult read and is not written explicitly for political scientists. I will supplement the text with applications that should make the points clearer. Additionally, there will be a list of recommended readings that are more basic if you have trouble with Greene. Finally, I find Peter Kennedy’s *A Guide to Econometrics* a nice reference which attempts to provide some intuition about what is going on.

Grades will be assigned based on a combination of weekly homework assignments (25%) and a final exam (75%). While participation is not an explicit part of your grade, I reserve the right to improve your grade based on your performance in class.

## **Topics**

### **1. Introduction to statistical models and methodology**

Matrix algebra, distribution theory and probability, inference. Why do we use statistical methods and what do we want from the methods we use?

**Readings (I will make a set of these available in the grad lounge)**

Kennedy Chapter 1-2

Greene *Econometrics* Chapter 1, Appendices A, B, C

Namboodiri *Matrix Algebra: An Introduction* Sage Monograph

Fox *Applied Regression Analysis, Linear Models and Related Methods*, App D

Hanushek & Jackson *Statistical Methods for Social Scientists* Chapter 1, App II

**2. The classical linear regression model**

Assumptions of the model.

**Readings**

Greene Chapter 2 & 3

Other introductions:

Kennedy Ch 3

Fox Ch 5, 6, 9, 10

Hanushek & Jackson Ch 5

**3. Finite-Sample Properties of OLS**

What do those assumptions buy us? What happens if some of these assumptions are wrong?

**Readings**

Greene chapter 4

**4. Hypothesis testing and inference**

Testing various hypotheses, testing for structural changes. Goodness of fit.

**Readings**

Greene chapter 6, 3.5, 8.4

**5. Specification**

What happens if I have the wrong model?

**Readings**

Greene chapter 8

**6. Multicollinearity**

**Readings**

Greene chapter 4.9.1

**7. Measurement Error**

**Readings**

Greene chapter 5.6

## 8. Non-spherical errors

### Readings

Greene chapters 10, 11, 12.

## 9. Large-sample Properties of OLS

What if N gets really big? What if a few of the other assumptions are violated? Two-stage least squares

### Readings

Greene chapter 5

## 10. MLE and various extensions.

### Readings

Greene chapter 17, 21, 22

**Side topics:** during the one hour sessions we will do several separate topics, topics that are interesting and important but don't necessarily fit.

1. How not to lie with statistics—a smorgasbord of common mistakes.

King, Gary. 1986. How not to lie with Statistics: Avoiding Common Mistakes in Quantitative Political Science. *American Journal of Political Science*. 30(3): 666-687.

2. Multiplicative terms

Freidrich, Robert J. 1982. In Defense of Multiplicative Terms in Multiple Regression Equations. *American Journal of Political Science*. 26:797-833.

3. Interpretation and Clarify

King, Tomz, and Wittenberg. "Making the Most of Statistical Analyses: Improving Interpretation and Presentation" *AJPS* 2000 347-361.

4. Duration modeling

Box-Steffensmeier and Jones "Time is of the Essence: Event History Models in Political Science" *AJPS* 1997 pp. 1414-1461.

5. Bootstrapping

Mooney "Bootstrap Statistical Inference: Examples and Evaluations for Political Science" *AJPS* 1996 p. 570-602

These will be interspersed with homework assignments. I will let you know ahead of time which topic will be which week.

I expect that all students will conduct themselves in a manner that is consistent with the Aggie Code. Any lying or cheating in this class will be handled in accordance with Texas A&M policy.

**ADA Statement:**

The Americans with Disabilities Act (ADA) is a federal anti-discrimination statute that provides comprehensive civil rights protection for persons with disabilities. Among other things, this legislation requires that all students with disabilities be guaranteed a learning environment that provides for reasonable accommodation of their disabilities. If you believe you have a disability requiring an accommodation, please contact the Department of Student Life, Services for Students with Disabilities in Room 126 of the Koldus Building. The phone number is 845-1637.