PLAD 7100
Political Research With Quantitative Methods
Spring 2011

Monday 2–2:50 &
Wednesday 1–2:50
Gibson Hall S041

http://collab.itc.virginia.edu

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> "Inductive logic is unlike deductive or symbolic logic. In deductive reasoning, when you
> have true premises and a valid argument, the conclusion must be true too. Valid deductive
> arguments do not take risks. Inductive logic takes risks. You can have true premises, a
> good argument, but a false conclusion. Inductive logic uses probability to analyse that kind
> of risky argument."
> — Ian Hacking. 2001. *An Introduction to Probability and Inductive Logic*, xi.

This course will introduce you to some basic theory and methods for conducting quantitative analyses in political science, with a focus on statistics and econometrics. The central theme of the course consists in applying quantitative methods to explore and evaluate political science theories.

My goal in this class is provide this basic familiarity with statistics and econometrics for studying politics, and to lay a solid foundation for further coursework for those who choose to pursue quantitative analysis in more depth.

Thus, we will begin at the beginning—with basic probability theory—then move through single-variable statistical analysis, and conclude with regression analysis. The lectures and problem sets will include a moderate amount of statistical theory, because I believe strongly that familiarity with the underlying theory is critical to the smart application of statistical techniques. The later problem sets will shift the emphasis toward application and data analysis.

There are no prerequisites for the course. The course will include some mathematical content; however, no math beyond high school algebra is assumed before you begin.

Course Requirements
Requirements for this course include lectures, reading, homework assignments, a midterm exam, and a final exam.

The midterm will be held in class as noted on the syllabus below. The final will be held in class at the University-determined time for this course: Friday, May 6, from 9am–12noon. You will be allowed one page of notes (front only) for the midterm, and two pages (i.e., front and back of a single sheet) for the final.

Understanding statistics requires "learning by doing," and for that reason there are a number of homework assignments—about eight during the term. The early assignments will consists of "paper-and-pencil" exercises to help solidify your understanding of basic concepts and procedures; the later assignments will ask you to conduct analysis of real political science data that I provide. I encourage group work on homework assignments, although each student should write up and turn in his or her own set of answers.

Because the material in this course is cumulative, attending class consistently and staying current on the reading and homework is absolutely vital for your success. *Therefore, no incompletes will be given in this course.* In addition, anyone auditing the course is strongly encouraged to attend consistently and to complete the reading and homework assignments.

The statistical software we will use is Stata. The software and documentation are available on the computers in the Politics Department computer lab in Gibson Hall, as well as on some computers in other ITC computer labs (see http://www.itc.virginia.edu/labs/listSoftLocations.php?soft_title_id=125 for a listing). Stata is also available through the "UVa Hive," a virtual computer lab that you can connect to remotely. See http://itc.virginia.edu/hive/ for details on installing the appropriate software on your computer to access the Hive.

Though you do not need to purchase your own copy of Stata, you may wish to do so, especially if you anticipate further empirical work beyond this course. It is available for Windows, Macintosh and Unix platforms at a discount through ITC. See http://www.itc.virginia.edu/research/stata/ for purchase information. (*Note that the student version of Stata, so-called "small Stata," will not be sufficient to analyze the data sets for some of the problem sets; you will need the standard, "Intercooled" version of Stata.)*

Readings
There are several required books for this course. They should be available from the campus bookstore; used copies of the Wonnacott and Wonnacott book are also readily available on-line at a substantial discount.

> Achen, Christopher H. 1982. *Interpreting and Using Regression*. Thousand Oaks, CA: Sage.
>
> Fox, John. 1991. *Regression Diagnostics*. Thousand Oaks, CA: Sage.
>
> Wonnacott, Thomas H. and Ronald J. Wonnacott. 1990. *Introductory Statistics for Business and Economics*. Fourth Edition. New York: John Wiley & Sons.

In addition, we will read substantial portions of the following book, which is unfortunately out of print. I will make available copies of the relevant sections.

> Kelejian, Harry H. and Wallace E. Oates. 1989. *Introduction to Econometrics: Principles and Applications.* Third Edition. New York: Harper and Row.

If you plan to go on with statistical analysis, you might also consider purchasing the following resource as well. Hamilton's book is essentially a compendium of tons of example Stata commands, along with the output from Stata.

> Acock, Alan C. 2010. *A Gentle Introduction to Stata.* 3d edition. College Station, TX: Stata Press.

Copies of assigned articles will be available on-line.

Homework schedule (*subject to change)*

Assignments will be posted in the "Resources" section of the web site, and will be collected in class unless otherwise noted.

Assignment	Distributed	Due	
One	2/2	2/14	
Two	2/16	2/28	
Three	2/23	3/2	
Four	3/14	3/25	(Friday)
Five	3/21	4/1	(Friday)
Six	3/28	4/8	(Friday)
Seven	4/4	4/18	
Eight	4/18	5/2	

Course Schedule and Outline

January 19: Introduction to the Course

January 24 & 26: Basic Probability & Descriptive Statistics
    Wonnacott & Wonnacott, skim chapter 1, read sections 2-1, 2-2, 2-3 & 2-6; chapter 3

January 31 & February 2: Probability Distributions and Random Variables
    Wonnacott & Wonnacott, chapters 4-5

February 7 & 9: Sampling and Point Estimation & Introduction to Statistical Computing using Stata
    Wonnacott & Wonnacott, chapters 6-7

    Optional: Stata Documentation; in particular *Getting Started with Stata* and selections from the *Stata User's Manual*

February 14 & 16: Interval Estimation and Hypothesis Testing
    Wonnacott & Wonnacott, chapters 8-9

    Cohen, Jacob. 1994. "The Earth is Round (p<.05)" *American Psychologist* 49(12):997-1003.
        Available from Collab.

February 21 & 23: Univariate & Bivariate Data analysis
    Wonnacott & Wonnacott, section 2-7

    Kastellec, Jonathan P., and Eduardo L. Leoni. 2007. "Using Graphs Instead of Tables in Political Science."
    Perspectives on Politics 5(4), **pages 755-763**.

    Epstein, Lee, Andrew D. Martin, and Matthew M. Schneider. 2006. "On the Effective Communication of the
    Results of Empirical Studies, Part I." *Vanderbilt Law Review* 59(6):1811-71.

    Epstein, Lee, Andrew D. Martin, and Christina L. Boyd. 2007. "On the Effective Communication of the
    Results of Empirical Studies, Part II." *Vanderbilt Law Review* 60(3), **pages 801-31**.

February 28 & March 2: Tabular Data Analysis and Chi-Square; Multivariate Analysis
    Wonnacott & Wonnacott, chapter 17

March 7 & 9: Spring Break (no class)

March 14: Ketchup and review for midterm

March 16: **Midterm Exam in class**

March 21 & 23: Bivariate Regression
    Wonnacott & Wonnacott, chapter 11 and 12-1, 12-2

    Achen, pages 1-37

    Kelejian & Oates, pages 1-9, 25-33, and 43-86

March 28 & 30: Hypothesis Testing, Confidence Intervals, Prediction
    Wonnacott & Wonnacott, 12-3 through 12-5

    Achen, pages 37-51

    Kelejian & Oates, pages 89-104 and 123-131

April 4: Multiple Regression I
 Wonnacott & Wonnacott, chapter 13

 Kelejian & Oates, chapter 4 (134-161) and 200-202

 Fox, pages 1-10

April 6: No class

April 11 & 13: Multiple regression II
 Kastellec, Jonathan P., and Eduardo L. Leoni. 2007. "Using Graphs Instead of Tables in Political Science." *Perspectives on Politics* 5(4), **pages 763-768**.

 Epstein, Lee, Andrew D. Martin, and Christina L. Boyd. 2007. "On the Effective Communication of the Results of Empirical Studies, Part II." *Vanderbilt Law Review* 60(3), **pages 831-46**.

April 18 & 20: Regression Topics: colinearity, dummy variables, interaction terms, and more
 Achen, pages 51-79

 Fox, pages 10-21 and 75-80

 King, Gary. 1986. "How Not to Lie With Statistics: Avoiding Common Mistakes in Quantitative Political Science." *American Journal of Political Science* 30(3):666-87.
  Available from Collab; also from http://links.jstor.org/sici?sici=0092-5853%28198608%2930%3A3%3C666%3AHNTLWS%3E2.0.CO%3B2-3.

 Kelejian & Oates, pages 205-211 and 178-186

April 25 & 27: Regression Topics: Non-linear relationships, variable selection and model specification, outliers and influential data
 Wonnacott & Wonnacott, chapters 14

 Fox, chapters 4 & 7

 Bartels, Larry M. 1990. "Five Approaches to Model Specification." *Political Methodologist* 3(2):2-6.
  Available from the course web site.

 Kelejian & Oates, pages 251-256

May 2: Review, catch up, and "where do we go from here?"

May 6: **Final Exam** (9am–12noon)