

## PLS 801: Quantitative Techniques in Political Science

Fall 2010

Tuesday/Thursday 12:40-2:00PM

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Kurt's Hours: 2-4 PM; Mon/Wed.

Kurt's Office: 212 S. Kedzie Hall

### Course Description

This course introduces quantitative methods to graduate students in political science. Topics in this course include descriptive statistics, probability, sampling, and statistical inference. You will soon realize that little of this course will directly contribute to your understanding of politics. Do not fret. The goal of this course is to build a solid understanding of concepts like probability, sampling, and statistical inference which are the basis for practical quantitative research in applied courses like PLS 802. With these tools you will soon be able to critically evaluate new research and learn about politics on your own.

### Course Prerequisites

There are no expectations or prerequisites of any math or statistics training at the undergraduate level. Those with less background in mathematics should feel free to ask questions about unfamiliar techniques but recognize they may need to work harder at times to complete course requirements. Students are expected (and required) to be enrolled in the Political Science Ph.D. program.

## Course Materials

This class will require you to use two resources.

### Required Book

*Mathematical Statistics with Applications* 7th Edition (or 6th). Brooks/Cole: Belmont, CA.

Available at the bookstore or online retailers for purchase. The earlier edition is fine to learn from, except at times you will need to get the problems from your classmates. I apologize for the cost, but all competitors are equally expensive. There is also an electronic-only version which is not as handy but about \$40 cheaper, but it costs you more in the sense you cannot keep it and there is no resale value.

### Computing Resources

This course will also introduce you to computer resources and software that are prominently used in political science. Some class assignments will require you to use these for completion. Your TA will lead an introduction to both these programs within the next month.

- **R** is a free, user-developed software environment for statistical computing and graphics. It runs on Windows, Linux, and Macs. More information at: <http://cran.r-project.org>. R updates frequently and the 2nd floor computer lab has an out-of-date version installed that may not work the best.
- **Stata** is a commercial software program for statistical computing and graphics. Other similar popular programs are SPSS and SAS, but Stata is the most popular among political scientists trained in the last 20 years. You are not expected to purchase Stata; the 2nd floor computer lab computers have it installed on them.

It is your responsibility to make sure you have adequate access to a computer for class assignments.

## Recommended Books

You do not have to have these books to take this course. However, if you want to familiarize yourself with either statistical program, then these should help.

- Kohler, Ulrich and Frauke Kreuter. 2009. *Data Analysis Using Stata*. 2nd Edition. College Station, TX: Stata Press
- Verzani, John. *Using R for Introductory Statistics*. Boca Raton, FL: Chapman & Hall/CRC.<sup>1</sup>

## Requirements and Grading

Your grade will be comprised of the following components:

1. Assignments (40%): Assignments cover class material and will be due on a frequent basis. You are required to hand in a hard copy of each assignment at the beginning of class on the assignment's due date or else you will be given a zero.

**Note:** Many of these assignments will require you to use and analyze a political science data set. Please find a single data set on a topic that interests you (talk to fellow graduate students or me), as you will use it in multiple assignments.

2. Midterm (30%) and Final (30%): Each test will assess your knowledge and command of the course's material. The final, although technically non-cumulative, is essentially cumulative.

Grading in this class follows typical graduate school conventions. A 4.0 represents very good work, a 3.5 represents adequate completion of the course, and a 3.0 or lower generally indicates less than adequate (or worse) performance.

**Note:** For your benefit, I do not give out incompletes. I also do not accept late assignments.

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<sup>1</sup>A shorter, earlier (but still useful) version of this book can be downloaded freely at: <http://cran.r-project.org/doc/contrib/Verzani-SimpleR.pdf>

## (Tentative) Schedule

WEEK	TOPIC	READING
Sep. 2	No Class - Read Syllabus (APSA)	
Sep. 7 & 9	Math/Calculus Review; Descriptive Statistics	Ch. 1
Sep. 14, 16, & 21	Probability Basics; Bayes' Rule	Ch. 2
Sep. 23, 28, & 30	Discrete Variable Processes and Analysis	Ch. 3
Oct. 5, 7, & 12	Continuous Variable Processes and Analysis	Ch. 4
Oct. 14 & 19	Multivariate Probability; Variance and Covariance	Ch. 5
Oct. 21	Review; Functions of Random Variables	Ch. 6 (skim)
MIDTERM: COVERING CHAPTERS 1-5 ON OCTOBER 26		
Oct. 28 & Nov. 2	Sampling Distributions; Central Limit Theorem	Ch. 7
Nov. 4, 9, & 11	Estimation and Conf. Intervals	Ch. 8
Nov. 16	Properties of Point Estimators	Ch. 9.1-3
Nov. 18 & 24	Hypothesis Testing	Ch. 10
Nov. 26	No Class (Thanksgiving)	
Nov. 30 & Dec 2	Analysis of Variance	Ch. 13.1-7,11
Dec. 7 & 9	Chi-square tests and Review	Ch. 14.1-4
FINAL EXAM: MONDAY DECEMBER 13: 12:45-2:45		

## A Couple Last Things

### Group Work and Academic Misconduct

I recognize that working in groups is essential to scientific progress. You are allowed to collaborate with others to complete the assignment portion of this class. However, you need to write up your answers separately such that you show your own personal perspective on the topic. In other words, assignments that are exact copies of each other are not accepted and will both be given zeroes. **Warning:** Extensive group work can give you a false sense of knowledge before a test, make sure you have a personal comprehension of a topic after working on it in groups.

Academic misconduct will not be tolerated. Cheating or plagiarism is an insult to me, your peers, and yourself; it is not to be tolerated. Instances of cheating will be handled according the school's policy on integrity of scholarship and grades.

**Electronic Submissions**

As a general rule, students should always submit their work in paper form. If, under special circumstances, you are submitting a document electronically, then you need to submit it in an archival format (.pdf, .ps, .dvi). This means no modifiable Word documents which may require specialized macros (.doc).