

PS 309: Quantitative Political Analysis

MWF, 10:10 - 11:00am, 112 Boucke

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Office Hours Mon 4:30-5:30pm, Thurs 2:30-3:30pm
Or by appointment
(Or feel free to drop by)

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1. INTRODUCTION

There are two purposes to this class. The first is to teach you how to use numbers and data to accurately construct and test theories about social science. The second is to help you learn how to incorporate your statistical knowledge and data skills into a convincing and truthful argument that anyone, even without statistical knowledge, would be persuaded by. These are skills that are important throughout numerous fields, not only modern political science, but business and law and public policy, and of course, the other social sciences.

The goal is not just to learn math or statistics, but to learn how to reason through problems using data, how to think about and not be fooled by data, and how to use your statistical knowledge to frame convincing arguments. To learn these skills we will spend a lot of time immersed in actual data sets, and learn through application. We will examine data in lecture, we will explore data in the computer lab, and in the assignments we will use more data. The key thing to remember throughout this class is that we will learn numerous formulas and techniques, but these should always supplement and aid our own reasoning about the problem, never replace it. Statistics are tools and not robots. We use them, we don't just turn them on. And of course the more we practice using them the better we will become.

The class will meet in the computer lab, although often the beginning of the week will be more lecture oriented, and the end of the week may be more data oriented where there will be some lecture, some demonstration using the computers, and some hand on problem solving by students.

2. GRADING

Grades will be based on problem sets (10 percent), quizzes (10 percent), a midterm (20 percent), a final (30 percent) and a series of short data essays (30 percent). Homeworks will be more common than data essays in the beginning of the class, and over time this will reverse. The midterm will cover the material in the first half of term and will take place in week 8 or 9. The final will not cover specific material from the first six weeks, except in so far as an understanding of this material is the foundation for the material that follows.

The most important part of the class are the data essays, which will be short essays (two to four pages) that use the techniques we have learned to answer problems in political science using real datasets drawn from the spectrum of fields in political science. A large portion of the final will also be in this style.

Some of the homework and some of the work with the data essays will require the use of Stata, which will probably require using computers in the lab, or in other labs around campus where Stata is installed. Students may work in pairs on homeworks and data assignments, however, all data assignments must be individually written and results and figures individually generated. You should budget time in the labs to complete portions of most weeks assignments, however, this class is not a test of your Stata ability, and you should always feel free to ask the professor or teaching assistant for Stata help or commands.

3. AGENDA OF SPECIFIC TOPICS

There are several topics, such as causality and substantive significance, that we will discuss so continuously they will seem like a class mantra. However, there are more specific statistical topics and skills that we will learn in a specific order. These are as follows:

- Week 1: *Describing Data*
Histograms and Box plots. Means, Modes and Medians. Measures of Spread.
- Week 2,3: *The Normal Approximation*
Distributions, Normal tables, Z -scores, the Central Limit Theorem.
- Week 4: *Behavior of samples from known populations*
Distributions of Repeated Samples. Standard Errors. Opinion Polls and Forecasting.
- Week 5: *Inference about populations from samples*
Inference from Sample Information. Confidence intervals. Alpha values. Election Forecasting.
- Weeks 6,7: *Comparing Groups*
Differences between population means. Dummy variables. Causal Reasoning.

Midterm is currently scheduled Monday, Wednesday, Friday of Week 8 (Feb. 27 - March2), but may be moved to Week 9 (March 12-16).

- Week 9: *Bivariate Linear Regression*
Relationships between variables. Scatterplots. The equation of the line. Least squares estimates.
- Week 10: *Bivariate Regression Continued*
Regression with added dummy variables. Equations of parallel lines. Examination of residuals.
- Weeks 11: *Multivariate Regression*
The hyperplane. Testing competing theories. Z -factors and intermediate variables.
- Weeks 12, 13: *Comparing Variables and Theories*
Magnitude and relative magnitudes of effects. Theory testing and comparative statics. Pooling problems. Forecasting.
- Weeks 14,15: *Generalized Least Squares*
Log-linear relationships. Power laws. The linear probability model.

Each week we will also explore various data sets that have substantive political questions that can be answered with the skills we are learning.

4. NOTES AND TEXT

Most weeks there will be class notes. A good, basic statistics book that works as a supplementary reading source is *Introduction to Probability and Statistics* by Mendenhall, Beaver and Beaver. There are a large number of editions and there isn't much difference between at least the seventh to the thirteenth (current) editions, so lo to pick up an old used copy cheaply if you want a supplementary textbook. The current edition is \$190 new. You can get a used copy from <http://abebooks.com> for ten dollars or less, including shipping.

ACADEMIC DISHONESTY

The Department of Political Science, along with the College of the Liberal Arts and the University, takes violations of academic dishonesty seriously. Observing basic honesty in ones work, words, ideas, and actions is a principle to which all members of the community are required to subscribe.

All course work by students is to be done on an individual basis unless an instructor clearly states that an alternative is acceptable. Any reference materials used in the preparation of any assignment must be explicitly cited. Students uncertain about proper citation are responsible for checking with their instructor.

In an examination setting, unless the instructor gives explicit prior instructions to the contrary, whether the examination is in class or take home, violations of academic integrity shall consist but are not limited to any attempt to receive assistance from written or printed aids, or from any person or papers or electronic devices, or of any attempt to give assistance, whether the one so doing has completed his or her own work or not.

Lying to the instructor or purposely misleading any Penn State administrator shall also constitute a violation of academic integrity.

In cases of any violation of academic integrity it is the policy of the Department of Political Science to follow procedures established by the College of the Liberal Arts. More information on academic integrity and procedures followed for violation can be found at:

[http://www.la.psu.edu/CLA-Academic Integrity/integrity.shtml](http://www.la.psu.edu/CLA-Academic%20Integrity/integrity.shtml)

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<http://www.equity.psu.edu/ods/>

Instructors should be notified as early in the semester as possible regarding the need for reasonable accommodations.