In this course you will learn to understand the most common statistical techniques used in political science and acquire the skills necessary to use these techniques and interpret their results. Mastery of these techniques is essential for understanding research on public opinion and voting behavior, electoral studies, comparative and international political economy, the causes of war, regime change, legislative success, and many other topics. In this class you will read examples of quantitative research on democracy, public opinion, and elections. But more than that, you will actually participate in research by replicating what others have done and by doing original analyses yourself. Therefore, in addition to getting acquainted with some sophisticated research on interesting political topics, you will acquire many of the skills you need to carry out quantitative research on your own. These skills include writing advanced spreadsheet programs; finding and downloading datasets; doing the most common sorts of analyses in a statistical package; writing short reports on your findings; and reporting your findings orally and graphically.

The reading load is intentionally light so that you have time to experiment with the abundant data at your disposal, and to do a good job on the many small assignments. Several are ungraded exercises. Ten of them are graded assignments, with the following weights and due dates:

10%  Sep. 13: Code 4 democracy variables for 25 countries.
5%  Sep. 20: Calculating means and standard deviations of democracy ratings using Excel.
10%  Sep. 27: Write your own descriptive report based on survey data, using SPSS.
5%  Sep. 29: Problem set on standard errors and sample size.
10%  Oct. 13: Generate and interpret four cross-tabs using survey data
5%  Oct. 27: Calculate and interpret Chi-square and strength-of-association stats for 2 tables.
5%  Nov. 1: Replicate Tufte's table 1.1.
5%  Nov. 3: Calculate inter-coder correlation matrix in Excel using our democracy data.
10%  Nov. 29: Replicate a multivariate regression using SPSS.
15%  Dec. 6: Write-up of revised multivariate regression analysis of your choice.

There will be a final exam in class, at the computers, which will count as 20% of the grade. I reserve the right to lower your final grade by a sign if you barely participate in class or if your assignments are often late. Assignments must be turned in before the class in which they are due.

Two textbooks are available for purchase at the bookstore in the CAPP section:


Johnson et al. is required; George and Mallery is recommended. Most other readings are available through the library's e-journal locator. Any exceptions are explained below.
My website will have a page of links to the on-line datasets we will be using. My homepage address is [http://www.nd.edu/~mcoppedg/crd](http://www.nd.edu/~mcoppedg/crd).

Some additional references, not assigned below, that you may find useful include:

- A good web reference work on SPSS: [http://sbm-connect.tees.ac.uk/webstat/content%20pages/chapter1/CHAPTER1.HTM](http://sbm-connect.tees.ac.uk/webstat/content%20pages/chapter1/CHAPTER1.HTM).

### Schedule of Readings and Assignments

#### August 23: Getting to Know You: Demonstration of a Survey
We will fill out and analyze, in class, a brief, fun survey to get a feel for what is possible.

- No assigned reading.

Exercise for August 25: Come prepared with a hypothesis for refinement during class discussion.

#### August 25: Political Hypotheses and Concepts
Can politics be studied scientifically and quantitatively? You will present a hypothesis and the class will discuss how it might be quantified and tested.


#### August 30: Mining the Internet for Quantitative Political Data
You will learn to convert Excel and other data to SPSS with the SPSS Data Wizard and DBMS-Copy, and generate descriptive statistics and graphs in SPSS. I will show you how to access other datasets from the Internet, how to use codebooks, and how to recode and transform data.


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**Part One: Description (Univariate Analysis)**

#### September 1: No class, due to APSA Meeting in Washington
September 6: Measuring Democracy and Other Political Phenomena
You will get acquainted with the basic techniques for measuring political phenomena, using democracy as an example.

- PSRM chapter 4
- Shively chapters 4-5. This will be in the Reserve Room and e-reserves.

Exercise for September 8: Replicate the coding of the four polyarchy scale variables for five countries using information from 2004. Guidance to sources will be provided in class.

September 8: Using a Spreadsheet to Rate Countries
No additional reading. You will bring in your preliminary coding of 5 countries. We will compare your ratings with others’ and discuss and resolve coding discrepancies and if necessary, revise coding criteria. I will show you how to enter your data into an Excel spreadsheet and how to document coding decisions.

Graded Assignment for September 13 (10%):
By 9:00 am, 9/13, submit spreadsheet with coding of an additional 20 countries (to be assigned), for a total of 25.

September 13: How Many Dimensions Does Democracy Have?
You will learn to use functions in Excel, such as creating a sum and sorting by it. This skill will then enable you to try to scale your ratings. How many dimensions are there?

No required reading.
- Recommended: David Nachmias and Chava Nachmias, Research Methods in the Social Sciences, second ed. (St. Martin’s Press, 1981), chapters 2, 6, and 15;

September 15: The Fuzzy Center: Measures of Central Tendency and Dispersion
You will learn to calculate the mean, mode, median, and standard deviation in Excel, and to generate and interpret histograms. I will demonstrate the Rice Virtual Lab in Statistics (RVLS) simulation on Mean and Median http://www.ruf.rice.edu/~lane/stat_sim/descriptive/index.html. You should experiment with this on your own, too.

- PSRM chapter 11 (305-327 only).

Graded Assignment for September 20 (5%):
Using your spreadsheet, calculate the mean and standard deviation for each component of the component of the democracy ratings for each country; the mean and standard deviation of the summary democracy ratings for each country in 1985, 2000, and 2004; and produce histograms of the summary ratings for these three years.

September 20: Reporting Survey Data
We will discuss a landmark survey of global attitudes as an example of a descriptive survey report. Then you will learn to download survey data for your own analysis.

- Pew Global Attitudes Project, “American Character Gets Mixed Reviews,” (Pew Research Center for the People and the...
Press (June 2005)  
[“PewGlobalAtts2005.pdf” in the course folder.]

- PSRM chapter 10.

Graded Assignment for September 27 (10%):
Generate your own report based on at least 5 variables from either the 2002 Pew survey or the General Social Survey. It must employ some measures of central tendency and dispersion and include some informative graphics. Further instructions will be given.

September 22: Class cancelled for inauguration of Father Jenkins

September 27: Sampling: Creating Political Microcosms
Sampling is the nearest thing we have to magic. It gives us the ability to make valid inferences about a whole population by examining only a small part of it. You will learn how to take a random sample and how to calculate the impact of sample size and selection bias on inferences about a population. We will play with the RVLS Sampling Distribution Simulation at http://www.ruf.rice.edu/~lane/stat_sim/sampling_dist/index.html. You should experiment with this on your own, too.

- PSRM chapter 7
- Edward Tufte, Data Analysis for Politics and Policy (Prentice-Hall, 1974), pp. 40-46 on “Election-Night Forecasting.” This will be in the Reserve Room and e-reserves.

Also, on your own, look at Bill Trochim’s webpages on statistical sampling terms: http://trochim.human.cornell.edu/kb/sampstat.htm and probability sampling: http://trochim.human.cornell.edu/kb/sampprob.htm

Graded Assignment for September 29 (5%):
Do the problem set on standard errors and sample sizes that is in the course folder.

September 29: How Precisely Do We Know What We Know?
This is a quick introduction to some aspects of probability theory, with an emphasis on the highly useful concepts of the normal distribution and confidence intervals. In class, we will play the Normal Tool Game at the Utah Virtual Lab: http://www.psych.utah.edu/stat/bots/game7/Game7.html and take a look at the RVLS simulation of confidence intervals: http://www.ruf.rice.edu/~lane/stat_sim/conf_interval/index.html but you should experiment with these on your own, too. Also, read:
- PSRM chapters 11 (327-337) and 12 (357-63).
- Recommended: George and Mallery chapter 11.
Part Two: Explanation (Bivariate Analysis)

October 4: Scatterplots
Scatterplots are a beautiful way to get a quick, intuitive idea about the relationship between two continuous variables and the possible reasons for the relationship. You will read an influential example with many scatterplots and learn to produce them in various ways in Excel and SPSS. We will also discuss how to interpret scatterplots you produce in class.

- Recommended: George and Mallery chapter 5.

Exercise for October 6: Generate and interpret three scatterplots using any relevant dataset.

October 6: Scatterplot Presentations
Give an oral presentation presenting and interpreting one scatterplot using any relevant dataset.

October 11: Did All Good Things Go Together in the Twilight of the Soviet Union? Cross-Tabulation
The real power of surveys comes from cross-tabulation: comparing answers to one question with answers to another. You will read a politically important example of this and learn to do interpret such tables and produce them yourself.

- Recommended: George and Mallery chapter 8.

Exercise to present on October 13 (10%):
Generate and interpret four cross-tabs using General Social Survey data, the 2000 American National Election Study, the 2002 Global Attitudes Project data, or other survey data.

October 13: Cross-tab Presentations
You will present your own discoveries and hear about others’.

*** Fall Break ***

October 25: Interpreting Tables–Strength of Association vs. Statistical Significance
Often it is useful to calculate a summary statistic to measure the strength of association in a table. However, some relationships that seem strong may be accidents, the result of chance. How can we find out how much of a danger a chance association is?

- PSRM chapter 12 (pp. 350-357 only).
- re-read Finifter and Mickiewicz to see how the gamma and tau-c coefficients were used.

In class, we will do the RVLS simulation of Chi-square test of deviations at [http://www.ruf.rice.edu/~lane/stat_sim/chisq_theor/index.html](http://www.ruf.rice.edu/~lane/stat_sim/chisq_theor/index.html) and the RVLS Contingency-table simulation at [http://www.ruf.rice.edu/~lane/stat_sim/contingency/index.html](http://www.ruf.rice.edu/~lane/stat_sim/contingency/index.html), but as usual, you should experiment with these on your own, too.

- Recommended: George and Mallery chapter 8.
chapter 8.

Graded Assignment for October 27 (5%):
Calculate appropriate strength-of-association statistics and do Chi-square significance tests on 2 tables you did before and write a brief (a few sentences) interpretation of each.

October 27: Which Average is Bigger?
Really.
I will be at a USAID meeting in Washington to assess its Democracy Promotion efforts. You will have a guest lecturer.
There are other techniques for figuring out whether two averages are really different from each other, as opposed to accidentally different. Here you will learn about difference of means tests. In class, we will do the RVLS simulation on Repeated Measures.

• Edward Tufte, *Data Analysis for Politics and Policy* (Prentice-Hall, 1974), chapter 1 (pp. 1-30). This will be in the Reserve Room and e-reserves.
• PSRM chapters 12 (363-69) and 13 (393-405)
• Recommended: George and Mallery chapters 9 and 12.

Graded Assignment for November 1 (5%):
Replicate Tufte’s Table 1-1 (p. 23) on the impact of auto inspections on death rates using the data under “Density” at the bottom of the table. Perform a t-test. You will have to enter the data yourself.

November 1: Which Things Vary Together? Correlation
Correlation coefficients are very common statistics for the association among two variables. You will learn to create them and interpret them correctly.

• Look over Putnam et al., “Explaining Institutional Success,” again to absorb the significance of the correlation coefficients.

• Jeffrey A. Segal and Albert D. Cover, "Ideological Values and the Votes of United States Supreme Court Justices” *American Political Science Review* 83:2 (June 1989): 557-565. (e-journal)
• Recommended: George and Mallery chapter 10
• PSRM chapter 12 (377-83).

Graded Assignment for November 3 (5%):
Design a spreadsheet correlation program and calculate the inter-coder correlation matrix for any variable in our democracy data. Check your work with SPSS.

November 3: Correlation Presentations
After trouble-shooting your correlation spreadsheets, we will assess the inter-coder reliability of our polyarchy scale and discuss its interpretation.

November 8: How Much Democracy Can $1,000 Buy? Simple Regression
A more useful way to assess the relationship between two variables is to estimate a regression. You will read an influential example from democratization research, which will also give us a reason to discuss non-linear relationships and how to measure and test them. In class, we will do the RVLS simulations of Regression by Eye, Components of r, and the Transformations Demo, but you should experiment with them on your own, too.

• PSRM chapter 12 (369-377 and 383-85)
• Recommended: George and Mallery chapter 15.

Exercise: Study my Excel spreadsheet on bivariate regression until you understand what
it is doing. Use it to do a regression, using any of the datasets we have found, and check your results with SPSS.

November 10: Simple Regression Presentations
After trouble-shooting your bivariate regression spreadsheets, you will present the bivariate relationships you would like to test, from any of the datasets we have at hand.

Part Three: Holding Things Constant (Multivariate Analysis)

November 15: Multivariate regression
Sometimes what appears to be a relationship between Y and X is really a relationship between Y and Z in disguise. Multivariate regression enables us to hold Z (in fact, often many Zs) constant so we can tell whether the alleged relationship between Y and X is still there. In the second half of this class, we will explore relationships in the Green and Krasno data.

- PSRM chapter 13 (405-412)
- Recommended: George and Mallery chapter 16.

November 17: Multivariate Regression and the Impact of Campaign Spending
To make sure you have mastered the concept of multiple regression, we will discuss another example. This one assesses the impact of incumbent’s spending and challenger “quality” on congressional election races. I will also show you how to generate and interpret residuals and partial plots and explain why you should do this. In the second half of this class we will explore relationships in the Amorim Neto and Cox data.


November 22: Interactions in Regression
We use interactions to model situations in which the impact of X on Y depends on some other condition. Here is an interesting example that asks whether the number of successful parties in a country is the result of social cleavages, election laws, or an interaction between them:


Graded Assignment for November 29 (10%):
Replicate one table from either Amorim Neto and Cox or Green and Krasno using SPSS.

November 29: Logistic regression and the Probability of Being a Democracy
Ordinary multiple regression is fine when you are trying to explain something that is continuous. But when your dependent variable is an either-or, yes-or-no kind of thing, a different estimator is required: logistic regression. Here you will read a prize-winning example that models the probability that a country is a democracy or a dictatorship. The interpretation of logistic regression coefficients is especially tricky, so I will show you how to create a spreadsheet to translate coefficients into probabilities.
• Adam Przeworski, Michael Alvarez, José Antonio Cheibub, and Fernando Limongi, "What Makes Democracies Endure?" *Journal of Democracy* 7:1 (January 1996): 39-55. Their dataset is available in the course folder as "ACLP.sav"
• PSRM chapter 13 (412-430)
• Recommended: George and Mallery chapter 25

**Exercise for December 1:** Do your own multivariate regression analysis (logistic or not) and interpret it. Prepare a presentation of your findings. You will have an opportunity to revise this before it is graded.

**December 1:** Present and discuss your own multivariate regression analyses.

**Graded Assignment for December 6 (15%):**
Revise your multivariate analysis based on constructive criticism from class and write up your interpretation of it. A complete writeup will pose the research question, defend the plausibility of your working hypothesis, describe the data you are using, carry out at least one multivariate regression, display results in an edited and readable fashion, include a relevant scatterplot and partial plot, interpret the findings accurately and fully, and discuss the implications of the findings. In other words, it is a serious short paper.

**December 6:** Glimpses of What Lies Beyond
A quick tour of where you can go from here: factor analysis, log-linear models, time-series analysis, pooled cross-sectional time-series analysis, ARIMA models, and structural equations. You will not be responsible for this material on the final exam.

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I would be happy to hold a review session before the final exam.