

PSC 200: Applied Data Analysis

Spring 2014

Prof. Curt Signorino

Harkness 303

Office Hours: Tu & Th, 9-10am

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Course Description

How do we evaluate empirically the claims politicians make? How do we determine whether theories of political behavior are supported by evidence? What do reporters mean when they refer to a poll being accurate to $\pm 3\%$? In this course, students are introduced to data analysis, statistical inference, and research design relevant to political science research. Topics covered will include variable measurement, descriptive statistics, confidence intervals, hypothesis tests, correlation, and regression analysis.

Lectures: Mon & Wed, 11-11:50, Harkness 114

Lab: Fri, 11-11:50, Harkness 114

Attendance is required for the weekly lab sessions. During the labs, students will receive computer instruction, perform simple experiments, analyze data, and discuss homework problems.

Grading

Course grades will be based on labs/homeworks (40%), a midterm exam (20%), and a final exam (40%).

The lowest of the homework grades will be dropped when calculating the final course grade. This is to allow for illness or other such unforeseen events. That said, you are strongly encouraged to complete ALL homework assignments. Unless otherwise noted, homeworks will be handed out in lab and are due the following week at the beginning of lab. Students must deliver their homework *in hardcopy* to the TA. Late assignments will be penalized one

half-grade (e.g., B to B-) for each day they are late. Homeworks more than seven days late will receive a grade of zero. Finally, while you are encouraged to study together and to learn the software together, all assignments are to be completed individually.

Academic Honesty. Please be familiar with [the University's policies](#) on academic honesty. Students found to be copying from another student on HW's or exams will be given a grade of zero for that assignment or exam.

Readings

The following textbooks are **required**:

- Alan Agresti and Barbara Finlay, *Statistical Methods for the Social Sciences*.
This is the main textbook for the course. The newest copy is [the fourth edition](#). However, [the third edition](#) (1997) — which sells used for substantially less — is perfectly acceptable for this class.
- Larry Gonick and Woollcott Smith, *The Cartoon Guide to Statistics*.
Yes, this is a textbook for this course, and yes, it is required. It might be helpful to do each topic's reading from the *Cartoon Guide* before reading the equivalent sections in Agresti & Finlay.
- John Verzani, *SimpleR: Using R for Introductory Statistics*.
This is a free PDF about R, the computer program we'll be using for statistical analysis.

Most of the “recommended reading” below consists of articles, with links to an online pdf version (e.g., via JSTOR). To access these, you must be on the UR network or have a VPN connection. Articles without a web link are available on the course blackboard page or in the library reserves. From time to time, these articles may become ‘required’ reading for homework assignments.

Statistical Program: R

Students will be required to complete homeworks using the R program for statistical analysis. Labs will be held in Harkness 114. However, most academic computing labs on campus have R installed either on Macs or Windows PC's (see the [list of computing labs](#) for more information).

R is free, so you may want to install it on your own computer. To do so, you can download R from

- [Comprehensive R Archive Network \(CRAN\)](#). This is the original and most up-to-date version of R. Towards the top of the page is a section titled “Download and Install R.” Select your operating system (Mac, Windows, Linux) and follow the links.
 - [RStudio](#). This is an integrated environment for R. It contains an editor, console, help, and plot window all in one larger window. Many first-time R users prefer the RStudio environment. It is also free. Just click on the RStudio link at the beginning of this paragraph and follow the download instructions.
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Course Outline

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1 Course Introduction

Topics: Arrrgh! Why do I have to take this course?!

Required Reading:

- Agresti & Finlay, chapter 1.
- *Cartoon Guide*, chapter 1.

Recommended Reading:

- Mike Adams. 1990. “The Dead Grandmother/Exam Syndrome.” *Annals of Improbable Research*. ([ONLINE](#))

HW 1: Intro to R

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2 Basics of Data Analysis

Topics: Variables & Measurement, Sampling & Surveys, Randomization, Descriptive Statistics, Mean, Variance

Required Reading:

- Agresti & Finlay, chapters 2–3.
- *Cartoon Guide*, chapters 2, 6 (pp. 89–97).

Recommended Reading:

- Bernard Grofman, William Koetzle, and Anthony McGann. 2002. Congressional Leaders 1965-96: A New Look at the Extremism Versus Centrality Debate. *Legislative Studies Quarterly*. ([JSTOR](#))
- Michael McDonald and Samuel Popkin. 2001. “The Myth of the Vanishing Voter.” *American Political Science Review*, Vol. 95, Issue 4: 963–974. ([JSTOR](#))
- John Woolley. 2000. “Using Media-Based Data in Studies of Politics.” *American Journal of Political Science*, Vol. 44, Issue 1: 156–173. ([JSTOR](#))

HW 2: Variables & Measurement

HW 3: Descriptive Statistics

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3 Probability

Topics: Probability Basics, Discrete & Continuous Variables, Normal Distribution, Conditional Probability

Required Reading:

- Agresti & Finlay, sections 4.1–4.3 (third edition: 4.1–4.2).
- *Cartoon Guide*, chapter 3.

Recommended Readings: *Law, Probability, and Risk*, Vol. 5, Issue 2 (2006):

- Peter Tillers and Jonathan Gottfried. “Case Comment: *United States v. Copeland*: A Collateral Attack On The Legal Maxim That Proof Beyond A Reasonable Doubt Is Unquantifiable?”
- James Franklin. “Quantification Of The ‘Proof Beyond Reasonable Doubt’ Standard.”
- Jack Weinstein and Ian Dewsbury. “Comment On The Meaning Of ‘Proof Beyond A Reasonable Doubt’.”

HW 4: Probability

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4 Estimation and Inference

Topics: Sampling Distributions, Central Limit Theorem, Estimators & Their Properties, Confidence Intervals

Required Reading:

- Agresti & Finlay, sections 4.4–4.7 (third edition: 4.4–4.6), 5.1–5.4, 5.6.
- *Cartoon Guide*, chapters 6–7.

HW 5: Probability and Sampling Distributions

HW 6: Estimators and Confidence Intervals

5 Midterm Review

Midterm reviews held during lecture and lab.

6 Midterm Exam

Covers all material to date.

7 Hypothesis Tests

Topics: Hypothesis Tests, Type I and II Errors

Required Reading:

- Agresti & Finlay, 6.1–6.5.
- *Cartoon Guide*, chapters 8.

Lab will cover midterm answers and grades.

8 Comparing Two Groups

Topics: Difference of Means, Difference of Proportions

Required Reading:

- Agresti & Finlay, sections 7.1–7.4.
- *Cartoon Guide*, chapter 9.

Recommended Readings:

- James Payne. 1982. Career Intentions and Electoral Performance of Members of the U. S. House. *Legislative Studies Quarterly*. 7(1):93-99. ([JSTOR](#))

HW 7: Hypothesis Tests & Difference of Means/Proportions

9 Research Design

Topics: Types of Research Design, Internal & External Threats to Validity, Experimental Data

Required Reading:

- *Cartoon Guide*, chapter 10.
- James McDavid & Laura Hawthorn. 2005. *Research Designs for Program Evaluations*. Chapter 3. ([Sage Proof](#))([Google Books](#))
- Research Methods Knowledge Base, Section on [Design](#)

Recommended Readings:

- Thomas Walker, Lee Epstein and William Dixon. 1988, “On the Mysterious Demise of Consensual Norms in the United States Supreme Court.” *Journal of Politics*, Vol. 50, Issue 2: 361–389. ([JSTOR](#))
- Valeria Hoekstra and Jeffrey Segal. 1996. “The Shepherding of Public Opinion: The Supreme Court and *Lamb’s Chapel*.” *Journal of Politics*, Vol. 58, Issue 4: 1079–1102. ([JSTOR](#))
- Daniel Posner. 2004. “The Political Salience of Cultural Difference: Why Chewas and Tumbukas are Allies in Zambia and Adversaries in Malawi.” *American Political Science Review*, Vol. 98, Issue 4: 529–545. ([JSTOR](#))

HW 8: Research Design

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10 Crosstabs & Association

Topics: Cross-Tabulations, Goodness of Fit, Chi-Square Test, Measures of Association

Required Reading:

- Agresti & Finlay, chapter 8

Recommended Readings:

- Lee Epstein and Charles Hadley. 1990. “On the Treatment of Political Parties in the U.S. Supreme Court, 1900–1986.” *Journal of Politics*, Vol. 52, Issue 2: 413–432. ([JSTOR](#))
- Roy Licklider. 1995. “The Consequences of Negotiated Settlements in Civil Wars, 1945–1993.” *American Political Science Review*, Vol. 89, Issue 3: 681–690. ([JSTOR](#))

HW 9: Crosstabs & Association

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11 Correlation and Bivariate Regression

Topics: Linear relationships, Correlation, Bivariate Regression, Regression Assumptions

Required Reading:

- Agresti & Finlay, chapter 9.
- *Cartoon Guide*, chapter 11.

Recommended Readings:

- W.S. Robinson. 1950. “Ecological Correlations and the Behavior of Individuals.” *American Sociological Review*, Vol. 15, Issue 3: 351–357. ([JSTOR](#))
- Edward Tuft. 1973. “The Relationship Between Seats and Votes in Two-Party Systems.” *American Political Science Review*, Vol. 67, Issue 2: 540–554. ([JSTOR](#))

HW 10: Correlation & Bivariate Regression

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12 Multiple Regression

Topics: Multiple Regression, R^2 , F-Test, Dummy Variables, Interaction Terms, Quadratic Terms

Required Reading:

- Agresti & Finlay, chapters 10, 11.1-11.6, 13.1-13.4, 14.1-14.3, 14.5 (third edition: 14.1-14.4)

Recommended Readings:

- Mark Duggan. 2001. “More Guns, More Crime.” *Journal of Political Economy*, Vol. 109, Issue 5: 1086–1114. ([JSTOR](#))
- Steven Fish. 2002. “Islam and Authoritarianism.” *World Politics*, Vol. 55, Issue 1: 4–37. ([JSTOR](#))
- Bruce Russett. 1982. “Defense Expenditures and National Well-being.” *American Political Science Review*, Vol. 76, Issue 4: 767–777. ([JSTOR](#))

HW 11: Bivariate & Multiple Regression

HW 12: Multiple Regression: Dummies, Interactions, & Quadratic Terms

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13 Logistic Regression (if time permits)

Topics: Regression with Binary Data, S-curve, Likelihood Ratio Test

Required Reading:

- Agresti & Finlay, chapter 15.1-15.3

Recommended Readings:

- John Oneal and Bruce Russett. 1997. “The Classical Liberals Were Right: Democracy, Interdependence, and Conflict, 1950–1985.” *International Studies Quarterly*, Vol. 41, Issue 2: 267–294. ([JSTOR](#))

HW 13: Logistic Regression

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14 Final Exam Review

Final exam reviews held during lectures and lab the last week of class.

15 Final Exam (TBD: Finals Week)

Covers all material to date.

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NOTE: The course organization may be adjusted/optimized during the semester according to the pace of learning and the priority of topics. Students are responsible for attending lectures and maintaining an awareness of any changes to the course materials, homework requirements, or exam dates.