POLS 3316: Statistics for Political Scientists
Spring 2016
Tues. & Thurs., 1:00-2:30 pm, C105

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Course Overview:

Quantitative methods is the most important class you will take in the political science curriculum!
Ok, maybe that is an overstatement. But a basic understanding of statistics and probabilistic reasoning is
critical for your other political science classes, your understanding of political news, even a basic
understanding of public policy, and, for many of you, your future careers. Whether you are trying to
understand the latest public opinion polls, evaluating the effectiveness of a public works project, or
tackling a complex research question, an understanding of statistics and research methods will be
invaluable.

Yet, many political science students are intimidated by the prospect of quantitative research. This course
tries to overcome this hesitancy by providing a skills-based introduction to statistical analysis. The core
philosophy of this class is that if the material is practical, then students will be better motivated to invest
in learning these skills. Because this class has been designed for and by political scientists, our
applications will come primarily from studies of politics and policy.

Lectures will sometimes address abstract concepts, including probability theory, statistical distributions,
hypothesis testing, and data visualization. However you will be graded mostly on your ability to put tools
to their correct use.

This course complements POLS 3312 (Introduction to Research Methods in Political Science), which
focuses more on posing questions and collecting data than on conducting analysis. Both courses are
excellent preparation for undertaking a research project or pursuing a minor in quantitative social science.
Additionally, **this course satisfies a College of Liberal Arts and Social Sciences (CLASS) Core
Curriculum requirement in Math/Reasoning**. Finally, as of Fall 2009, this course will satisfy a
departmental requirement for the Bachelor of Science in Political Science. Thus, there are good reasons to
persevere when the going inevitably gets tough.

Course Materials and Grading:

I have assigned one textbook, which is required reading:

William B. Ware, John M. Ferron and Barbara M. Miller. 2013. *Introductory Statistics: A Conceptual Approach Using R*. London: Routledge.

All other readings and handouts can be found on Blackboard. **(If you have not already, go to the class Blackboard site and navigate through it.)**

Grading will be based on homework assignments, a midterm and final examination, and attendance. Attendance will be taken at the beginning of each class period, and will be incorporated into your grade. Students will have three allowed absences for the semester. After these have been exhausted, students will lose points on their attendance for each additional absence. Student should come to class prepared with a notebook for taking notes, a calculator, and (ideally) a laptop computer with R installed. Homework will also be collected at the beginning of class, and late work will not be accepted.

The homework will involve a combination of problems that you should complete using a calculator and some problems that will require you to use the statistical software R. For those problems that ask you to complete the problem by hand, it is strongly recommended that you only use your calculator and that you show all your work. This will be required when you take the midterm and final exam. For the problems requiring you to use R, please see the provided download instructions for R and R Studio. Both of these programs are completely free of charge and work with any operating system. Both are also available in the political science computer lab located on the third floor of PGH (PGH 392).

Finally, students will be doing a research project involving a survey of the class throughout the semester. There are four parts to this: (1) students will design a question to ask the class; (2) students will take the survey; (3) students will produce summary statistics and graphs of the survey results for their question; and (4) students will analyze a bivariate relationship in the survey involving their question.

Breakdown of final grade.
Homework…………………………………………………………………………..100 pts.
Attendance………………………………………………………………………….50 pts.
Midterm examination……………………………………………………………..100 pts.
Final examination…………………………………………………………………150 pts.
Student question submitted…………………………………………………….....25 pts.
Student takes survey……………………………………………………………...25 pts.
Summary statistics report………………………………………………………...50 pts.
Bivariate analysis report………………………………………………………….50 pts.
Total……………………………………………………………………….......550 pts.

Statements on Academic Honesty, Accessibility and Disabilities:

I expect you to adopt the highest ethical standards in completing class assignments. Plagiarism is defined as the representation of another's works or ideas as one's own; this includes copying classmates' solutions to problems and handing them in as your own. Students found cheating will automatically receive a score of zero on that assignment. Repeat offenses, or more severe violations (like plagiarizing a take-home exam), will be dealt with more severely – potentially including a failing grade for the course and reporting to the academic discipline committee (which has the authority to expel students from the university).

All students are expected to adhere to the University of Houston's Policy on Academic Honesty, which can be found online at *www.uh.edu/academics/catalog/general/acade2.html#honesty*.

The Americans with Disabilities Act (ADA) is a federal law providing comprehensive protections for persons with disabilities. In accordance with ADA guidelines, I will attempt to provide all reasonable academic accommodations to students with disabilities that have been certified by the Center for Students with Disabilities. The CSD telephone number is (713) 743-5400, and CSD can be found online at *www.uh.edu/csd/index.htm*. Note that it is the student's responsibility to inform the instructor of the need for an accommodation.

Students should familiarize themselves with the university's policies on honesty, the academic calendar, religions holy days, and so on, at http://www.uh.edu/provost/stu/stu_syllabsuppl.html.

Class Schedule

Following is a schedule of lecture topics and assigned readings; this schedule may be adjusted as the semester proceeds.

Week 1 (8/25, 8/27):
Introduction to Quantitative Research in Political Science
- R and R Studio installation and practice session.
- Kapstein, E. B., & Converse, N. (2008). Why democracies fail. *Journal of Democracy*, *19*(4), 57-68.
- Mungiu-Pippidi, A. (2013). Controlling corruption through collective action. *Journal of Democracy*, *24*(1), 101-115.
- Slate Victory Lab, "Searching for the Mormon Haters." [Link to article on Blackboard.]
- Visit Polling Report website to start getting ideas for your survey question (www.pollingreport.com/issues.htm - also linked on Blackboard).

Week 2 (9/1, 9/3):
Introduction and Background
- Ware et al., chapter 1
- Key concepts:
    - experiments vs. quasi-experiments vs. observational studies
    - populations vs. sample
    - sampling units and sampling frame
    - parameters vs. statistics
    - independent vs. dependent variable
    - qualitative and quantitative variables
    - nominal, ordinal and interval scales
    - reliability (across time and across forms)
    - validity (content/face validity and criterion-related validity)
- *Assignment: Turn in Question for Survey (due 9/3 before class)*

Week 3 (9/8, 9/10):
Describing the Distribution of Data
[Note: 9/9 is last day to drop course without receiving a grade.]
- Ware et al., chapter 2, chapter 4 (only part on bar charts)
- Key concepts:
    - class intervals
    - relative and cumulative frequency distributions
    - stem-and-leaf displays
    - histogram
    - bar chart
    - central tendency
    - dispersion
    - skewness

Week 4 (9/15, 9/17):
Central Tendency
- Ware et al., chapter 3
- Key concepts:
  - order of operations
  - summation notation
  - Greek and Latin letters in statistics
  - mode
  - median (do not use the formula from Ware et al., I will give you an easier method)
  - mean
  - "trimmed" mean
  - product moment or balance point
  - least-squares principle
  - sampling stability
- *Assignment: Homework #1 (due 9/17 before class)*

Week 5 (9/22, 9/24):
Variability/Dispersion of Data
- Ware et al., chapter 3
- Key concepts:
  - interquartile range (do not use the formula from Ware et al, I will give an easier method)
  - average deviation
  - variance (sample and population – don't stress about the explanation)
  - standard deviation (sample and population – don't stress about the explanation)
  - degrees of freedom
- *Assignment: Take Survey (must be completed by midnight 9/24)*

Week 6 (9/29, 10/1):
Position and Correlation
- Ware et al., Chapter 5 (only p. 112-115), Chapter 6 (only p. 123-144).
- Key concepts:
  - Z-score
  - scatterplot
  - covariance
  - linear vs. non-linear relationship
  - Pearson correlation
  - Causality
- *Assignment: Homework #2 (due 10/1 before class)*

Week 7 (10/6, 10/8):
Midterm Week
> Finish covering any material that has not been covered and review for midterm.
> [Test will be on Thursday, 10/8.]

Week 8 (10/13, 10/15):
Regression
- Ware et al., Chapter 7
- Key concepts:
    - formula for a line (statistical notation) – intercept and slope
    - principle of least squares and least-squares regression line
    - sum of squared errors
    - standard error of estimate
    - error of prediction
- *Assignment: Descriptive Statistics Report (due 10/15 before class)*

Week 9 (10/20, 10/22):
Essentials of Probability
- Ware et al., Chapter 8
- Key concepts:
    - probability
    - simple vs. compound event
    - sample space
    - probability function
    - independent
    - mutually exclusive
    - additive rule
    - multiplicative rule
    - fundamental counting rule
    - permutations and combinations
- *Assignment: Homework #3 (due 10/22 before class)*

Week 10 (10/27, 10/29):
Probability and Sampling Distributions
[Note: 10/30 is last day to drop course with a "W".]
- Ware et al., Chapter 9
- Key concepts:
    - Bernoulli trial
    - Binomial distribution
    - expected value
    - random variable
    - probability distribution
    - sampling distribution

Week 11 (11/3, 11/5):
The Normal Distribution
- Ware et al., Chapter 10
- Key concepts:
    - Normal probability distribution
    - Central Limit Theorem
    - z-transformation
    - standard error of the mean
- *Assignment: Homework #4 (due 10/22 before class)*

Week 12 (11/10, 11/12):
Tests of Location
- Ware et al., Chapter 11
- Key concepts:
  - null hypothesis
  - level of significance
  - one-tailed vs. two-tailed hypotheses
  - alpha vs. beta
  - type I vs type II error

Week 13 (11/17, 11/19):
Other Tests of Location
- Ware et al., Chapter 12 (only p. 276-285), Chapter 13 (only p. 311-320)
- Key concepts:
  - t-distribution
  - t-test
  - χ^2
  - t-test for bivariate relationship

Week 14 (11/24, (no class 11/26 – Happy Thanksgiving!)):
Review of Statistical Significance
- No readings this week – we will be doing in-class exercises to reinforce what we have learned so far.
- *Assignment: Homework #5 (due 10/22 before class)*

Week 15 (12/1, 12/3):
Multivariate Regression
- No readings this week – I will introduce the concepts via lecture and we will do in-class demonstrations.
- Key concepts:
  - multivariate regression line
  - R-squared
  - Adjusted R-squared
- *Assignment: Bivariate Analysis Report (due 12/3 before class)*

Tuesday, December 15 – Final exam (2:00 – 5:00 pm)