Political Science 7962:
Seminar in Research Design and Quantitative Techniques

Instructor: Leonard Ray
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Office Hours: M,W 9:00-11:40;
or by appointment.

Semester: Fall 2016
Time: Friday 9:00 – 11:57
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Course Objectives

Political Science 7962 is the introductory course in quantitative methodology for graduate students in political science. The goal of the course is to enable students to evaluate, conduct, and report research using basic quantitative methods. The course introduces students to a set of introductory statistical concepts and techniques, and their practical application to research in the social and behavioral sciences. Topics covered include measurement, descriptive statistics, statistical inference, and tests of bivariate relationships. The course concludes with an overview of multivariate analysis.

This course is intended to train students to conduct their own research projects. Lectures and readings will present the theory behind some of the tools used in quantitative research. However, like many skills, a facility with statistical methods is acquired through experience and practice. Workbook assignments throughout the semester will allow students to apply concepts from the course materials to practical problems in Political Science. These exercises will also familiarize students with the STATA statistical package. Students from disciplines other than Political Science may opt to use the statistical packages SPSS or R if those languages are more widely used in their discipline. Students will also write a piece of original quantitative research applying their skills to a topic of their own choosing. These skills will be useful later, most immediately in POLI 7963.

The Nature of the Course

This is a course in the application of basic statistics to research problems in social science. As such this course will cover a very wide range of types of material. We will deal with math of course, because an understanding of the internal logic of statistical techniques is important to their correct interpretation, and is a foundation for future statistical training. There will be formulas because the formulas present, in a concise form, the logic underlying statistical methods. We will also cover some intuitions, vocabulary and social conventions surrounding statistical analysis, as well as best practice for conducting and reporting quantitative analyses. Statistics do not speak for themselves, and their meaning depends on our interpretation of the statistical results. The art of interpretation is also a major goal of this course. Note that these are very different types of information.

So for example, $\Sigma(x-\bar{X})(y-\bar{Y})$ is the **formula** for the covariation between two variables and provides the logic which drives correlation and OLS regression analysis. This is a straightforward matter of logic and mathematics.

In some types of graphical presentations of data (pie charts, histograms) surface area is equivalent to relative frequency. Understanding this **concept** will make the discussions of probability distributions easier to grasp. And probability distributions are the cornerstone of interpreting tests for statistical significance.

The .05 significance level is an arbitrary social **convention** which is, thanks to historical accident, extremely important in the way statistical results are interpreted and published (or not published.) .05 is an internationally shared convention but not a logical necessity.

The syntax or command file is a text file of commands used to manipulate data and generate statistical results in STATA or SPSS. **Best practice** in quantitative research is to always generate and save a command file for later use, and to share with researchers who are trying to replicate your results.

Required Texts

Master Math: Probability by Catherine A. Gorini ISBN 1435456564.

Statistics Essentials For Dummies ISBN:9780470618394 and *Statistics II for Dummies* ISBN 9780470466469
By Deborah Rumsey

And one NEW PHYSICAL COPY of the following:
A STATA Companion to Political Analysis Third edition by Philip H. Pollock III 978-1-4522-4042-8
or if you are not planning to take POLI 7963 next semester you can also use –
An SPSS Companion to Political Analysis Fourth edition by Philip H. Pollock III. ISBN 1435456564
or if you are up for a challenge–
An R Companion to Political Analysis Fourth edition by Philip H. Pollock III. ISBN-10: 1452287317

Other required readings will be placed on moodle. Assigned readings must be completed before the class period for which they are assigned to allow participation in class discussion.

Recommended Texts

The Chicago Guide to Writing about Numbers Second Edition by Jane Miller. ISBN-13: 978-0226185774
Essentials of Statistics for the Behavioral Sciences Frederick J Gravetter and Larry B. Wallnau ISBN 1133956572.
Social Statistics Hubert M. Blalock. ISBN 978-0070057524

About the Texts

About the required texts:

Master Math: Probability presents probability theory in more depth than most statistics textbooks. Given the importance of probability for statistical inference and for formal theories of strategic interaction, you need more than a superficial understanding of the topic. It will not help you win at the casino, but will help you understand why you lose, and how to lose more slowly. We will use this book for a few weeks on probability, and work some of the textbook exercises as homework problems.

Statistics Essentials For Dummies and *Statistics II for Dummies* provide a comprehensive and concise overview of the methods covered in this course. Deborah Rumsey writes in an engaging style that is intended to be accessible to an audience with a minimal background in mathematics. These books are also relatively inexpensive (together they cost under $30). We will use these throughout the course, they will help keep everyone on the same page literally and metaphorically.

All students must buy one of the *Companion to Political Analysis* workbooks. The editions listed differ mainly by the statistical software package used to do the lab exercises. The use of one of the current editions listed is important so that everyone has the same problems and exercises for their lab and homework assignments. DO NOT BUY A USED COPY, THE EXERCISES MAY HAVE BEEN TORN OUT ALREADY. DO NOT BUY THE KINDLE EDITION, YOU CANNOT HAND IN PAGES OF A KINDLE EDITION.

Which workbook / software to use?

STATA is an increasingly popular solution for Political Scientists because it is often quicker to implement new statistical techniques than is SPSS. STATA is also used in later courses in the statistics sequence. Poli Sci students are required to purchase the STATA edition of the workbook. Unfortunately, STATA is not available in all of the computer labs at LSU, though it is available in the first floor lab in 102 Stubbs Hall or can be purchased through tigerware. We will schedule a weekly lab period in 102 Stubbs to allow students using STATA to work on their lab assignments and research project. If you choose to purchase your own copy of STATA, you will find the SE and IC versions much more useful that the "student" version called small STATA. The small version has severe limits to the number of cases and variables which it can analyze. (Political theory students who will not take 7963 can safely opt for the SPSS workbook.)

SPSS is being rebranded by IBM as a solution for business applications with a decreased emphasis on the social sciences. Students not in Political Science may find SPSS a more convenient solution. SPSS is available in most of the computer labs on campus, and there is a (clunky) online "virtual lab" which allows you to run SPSS from home. In some disciplines, SPSS is the preferred software package- you may want to ask your faculty which program would be most useful to learn. There is extensive online help for both of these languages, and I can give you some help with SPSS.

R is freeware and very popular in some circles in geography, mathematics, and the physical sciences. R is very flexible and powerful, and often used in the development of new statistical techniques. There is extensive online help for R users, and an entire ecosystem of blogs, journals, and R user support groups. I regret that I am not at all fluent in R, and only use if when absolutely necessary.

About the recommended texts:

Essentials of Statistics for the Behavioral Sciences, (The unabridged version is longer but covers material which is less … essential.) This is a classic textbook for undergraduate psychology majors. It is a good treatment of the logic and mathematics behind the methods we will cover this semester, and has good practical examples of each technique. There are countless introductions to statistics in print and online, but this is one of the best. It is also relatively expensive, especially if I am trying to get everyone to purchase the same recent edition. Rather than require the current edition, I recommend that you purchase any recent edition.

Social Statistics by Hubert M. Blalock is a comprehensive introduction to statistics which has been popular sine the 1960's. This text influenced the way generations of social scientists approached quantitative analysis. The writing style is earnest and straightforward as befits a classic reference work. Do not expect cartoons and puns. Anyone planning to present themselves as a serious methodologist would do well to have a copy of Blalock on their shelf next to their copy of Gujarati's *Basic Econometrics*.

The Chicago Guide to Writing about Numbers is a handbook of useful tips for conveying quantitative information clearly and concisely. These tips are valuable for a wide range of communications ranging from lectures and general audience writing to administrative reports and scholarly articles. We will not cover this material in depth in class, but your mastery of it will be evident in the high quality of your research project.

Recommended Equipment

A **flash drive** is useful for saving work done in the computer lab.

Graded Requirements

Midterm Exam	[weight = 20%]
Final Exam	[weight = 20%]
Lab and Homework Assignments	[total weight = 30%]
Research Project	[weight = 30%]

The Midterm Exam will be a take home exam due Oct 14 at 9:00 AM. As such it is an open book exam- all course materials may be used during the exam. Collaboration with other students is, however, prohibited.
The Final Exam will be an in-class closed book exam Dec 9, 9:00-12:00.
The Lab Assignments will be taken from the workbook. Homework will be assigned on a few occasions.
The Research Project is a piece of original quantitative research. Students often use data related to their current research projects or to a field they find particularly interesting.

Assignment Schedule:

Labs	**Paper**
Chs 1 and 2 due Sept 16	**Section I due Sept. 16**
Ch 3 due Sept 23	**Section II due Sept. 30**
Ch 4 due Sept 30	**Section III due Oct. 14**
Ch 5 due Oct 14	**Section IV due by Oct. 28**
Ch 7 due Oct 21	**Section V due by Nov. 11**
Ch 6 due Oct 28	**Section VI due by Dec 5.**
ANOVA lab due Nov 4	**Final paper (all sections + appendix) due Dec. 9**
Ch 8 due Nov 11	
Ch 9 due Nov 18	
Ch 10 due Dec 2	

Reading Schedule
Complete indicated readings before class

Part I Conceptual Foundations and univariate descriptive statistics

Aug. 26: Introduction to the course, Vocabulary and Notation, Software, Datasets etc
Pollock "Companion to Political Analysis" Chapter 11
Gill Essential Mathematics sections 1.1 to 1.4 (on moodle)
Nagler 1995 "Coding Style" (on Moodle)

Sept. 2: Measurement/ Presenting & Summarizing Data
S. Stevens, "On The Theory of Scales of Measurement" Science V. 103 Issue 2685 677-680. (on moodle)
Johnson and Reynolds "Research Methods in Political Science" ch 4. (on moodle)
Statistics Essentials Chapters 1-3
Statistics II Chapter 2

Part II Foundations of Inferential Statistics
Sept 9: (Aside- Comparisons/ Controlling for a third variable) Introduction to probability
Gorini chapters 1,2,3
Kahneman 2011 Thinking Fast and Slow "Law of small numbers" (moodle)

Sept 16: Binomial Distribution/ conditional probabilities
Gorini chapters 4,5,6,7
Statistics Essentials Chapter 4
And crosstab reading from Pollock (moodle)

Sept 23: The Normal Distribution and the Central Limit Theorem
Gorini chapters 8,9
Statistics Essentials Chapters 5, 6

Sept. 30. Hypothesis Testing and Confidence Intervals
Ronald Fisher, The Design of Experiments London: Oliver and Boyd. Chr 2. (moodle)
On the Origins of the .05 Level of Statistical Significance Cowles and Davis 1982 American Psychologist V37 N5 pp553-558.
Statistics Essentials Chapters 7, 8
Statistics II Chapter 3

Oct 7 Fall Holiday

Part III Bivariate techniques
Oct 14 : Bivariate statistics, nominal and ordinal data
Statistics Essentials Chapter 11
Statistics II Chapter 20

Oct 21 : Sample means and the t distribution
Statistics Essentials Chapter 9

Oct 28 Analyzing Variance (ANOVA)
Statistics II Chapters 9-11

Nov 4 Correlation and Bivariate Regression
Statistics II Chapter 4

Part IV. multivariate techniques

Nov 11 Multiple Regression, Dummies and Interactions
Statistics II Chapter 5
Brambor, Clark, and Golder 2005 "Understanding Interaction Models: Improving Empirical Analyses" Political Analysis 14: 63-82 (moodle)
Suits 1957 "Use of Dummy Variables in Regression Equations" Journal of the American Statistical Association 52: 280 548-551 (moodle)

Nov 18 Nonlinear regression and Categorical Dependent Variables : Logit
Gill Essential Mathematics sections 1.5 to 1.7 (on moodle)
Pollock 2012 The Essentials of Political Analysis 4th ed CQ Press Ch. 9 (on moodle)
Statistics II Chapter 7
Statistics II Chapter 8

Nov 25 Thanksgiving Break

Dec 2 Wrap up, Measurement Error and cautionary notes on inferences
Abelson Ch 4 "Styles of Rhetoric" (moodle)
Abelson Ch 5 "On Suspecting Fishiness" (moodle)
Mock and Weisberg 1992. "Political Innumeracy: Encounters with Coincidence, Probability, and Chance" AJPS 36(4):1023-1046. (moodle)
Franco, Malhotra, and Simonovits "Publication Bias in the Social Sciences: Unlocking the File Drawer" Science 19 Sep 2014: Vol. 345, Issue 6203, pp. 1502-1505 (moodle)
Statistics Essentials Chapter 14
Statistics II Chapter 21
The ASA's Statement on *p*-Values: Context, Process, and Purpose
Ronald L. Wasserstein and Nicole A. Lazar
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