

Political Science 7962: Seminar in Research Design and Quantitative Techniques

Instructor: Leonard Ray
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Office Hours: T TH 10:30 -12:00;
or by appointment.

Semester: Fall 2011
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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 quantitative methods. The course introduces students to a set of basic statistical concepts and techniques, and their practical application to research in political science. 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 SPSS statistical package. The required research project is a piece of original quantitative research where students apply their skills to a topic of their own choosing. These skills will be useful later, most immediately in POLI 7963.

Required Texts

The Chicago Guide to Writing About Numbers
by Jane Miller. University of Chicago ISBN-10: 0-226-52631-3

SPSS Companion to Political Analysis Third edition
by Philip H. Pollock III. CQ Press; ISBN 1608716872

Master Math: Probability
By Catherine A. Gorini ISBN 1435456564

Statistics for Social Data Analysis 4th edition
David Knoke; George W. Bohrnstedt; Alisa Potter Mee
Thompsdon Wadsworth ISBN 0-87581-448-4

Other readings will be placed on reserve in the library, or are available electronically from JSTOR. Assigned readings must be completed before the class period for which they are assigned to allow participation in class discussion.

Recommended Equipment

A flash drive will be useful for saving work done in the computer lab.

Graded Requirements

Midterm Exam	[weight = 20%]
Final Exam	[weight = 25%]
Lab Assignments	[total weight = 30%]
Research Project	[weight = 25%]

The Midterm Exam will be a take home exam. 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 open book exam.

The Lab Assignments will be taken from the SPSS workbook.

The Research Project is a piece of original quantitative research. Students who wish to combine this research project with a research paper for another class may do so only with the written permission of the instructors of both courses.

The nature of the course

This is a statistics course. But not just a statistics course. And certainly not a math course. It is a course in the basic application of 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. This information is quite straightforward and objective, if technical. This is not a course on computer programming, and we will only scratch the surface of what can be done with modern statistical software. But students will learn enough statistical software to enter their data into a software package, and produce useful analyses of those data. We will also cover some basic vocabulary and social conventions surrounding statistical analysis, conventions which will vary across disciplines. Finally, statistics do not speak for themselves, and their meaning depends on our interpretation of the statistical results. The art of statistical interpretation is a topic students often find frustrating because there is more ambiguity in statistical research than many of you expect. Indeed inferential statistics is all about quantifying uncertainty, not about eliminating uncertainty.

Schedule of Readings and Homework

Please complete all readings before the day they are assigned so that you are prepared for the class lecture. Homework problems will serve to test your understanding of concepts after they have been covered in class.

Aug 22: Introduction to the course, Vocabulary and Notation, SPSS vs STATA

Read:

J. Miller Ch 1, 2

Knoke et al. Ch 1 and appendix A

Pollock Chapter 11

Aug 29: Measurement: Levels and Validity

Presenting & Summarizing Data I: Frequencies and Graphical Techniques

Read:

S. Stevens, "On The Theory of Scales of Measurement" *Science* Volume 103 Issue 2685 (June 7 1946) 677-680. ([on moodle](#))

Knoke et al. Ch 2 sections 2.1 to 2.3

J Miller Ch. 4 (pages 53-64), Ch 7

Sept 12: Presenting & Summarizing Data II: Central Tendency and Dispersion, Skewness and Kurtosis.

Read:

Knoke et al. Ch 2 sections 2.4 to 2.8

Skewness and Kurtosis formulae: <http://itl.nist.gov/div898/handbook/eda/section3/eda35b.htm>

J Miller Ch. 4 (remainder)

Lab 1 Workbook Chapters 1 and 2 due September 19

Sept 19: Bivariate statistics, nominal and ordinal data

Read

Knoke Ch 5

And crosstab reading from Pollock (on moodle)

Lab 2 Workbook Chapters 3 and 4 due September 26

Sept 26 Controlling for third variables by grouping, introduction to probability

Read

Knoke et al Ch 7

J Miller Ch 3 (pgs 33-40)

Gorini Ch 1, 2, 3

Lab 3 Workbook Chapter 5 due Oct 10

Oct 3 More Probability

Gorini Ch 4, 5, 6

Oct 10 The Logic of Inferential statistics: Hypothesis testing and confidence intervals

Ronald Fisher, *The Design of Experiments* London: Oliver and Boyd. Chapter 2. (moodle)

Mock and Weisberg, 1992. "Political Innumeracy: Encounters with Coincidence, Probability, and Chance"

AJPS 36(4):1023-1046. ([Moodle](#))

Knoke et al. Ch 3 sections 3.1 to 3.8

J Miller Ch 4, Ch 9

Oct 17 The Math of Hypothesis testing, Normal and Binomial distributions

Gorini Ch 7, 8, 9

Knoke et al. Ch 3 sections 3.9-3.11

Lab 4 Chapter 7 due Oct 23

Oct 23 Inferences about means and ANOVA

Gorini Ch 9

Knoke Ch 4

Lab 5 Chapter 6 due Oct 31

Oct 31 Correlation and Regression

Read

Knoke Ch 6

Nov 7 Regression and multiple regression

Read

Knoke Ch 6

Nov 14 Lab due Chapter 8

Nov 14 Multiple Regression

Read

Knoke et al Ch 8

Nov 21 Lab due, Chapter 9

Nov 21 Logit (if time permits)

Nov 28 Wrap up

Kritzer "The Data Puzzle: The Nature of Interpretation in Quantitative Research," *AJPS* Volume 40, Issue 1 (Feb.1996) 1-32. ([JSTOR](#))

Abelson Chapter 4 "Styles of Rhetoric" (moodle)

Abelson Chapter 5 "On Suspecting Fishiness" (moodle)