Political Science 7962:
Seminar in Research Design and Quantitative Techniques

Instructor: Leonard Ray
Office Stubbs 208 C
Office Hours: T TH 10:00-11:40;
or by appointment.

Semester: Fall 2013
Time: Mondays 9:00 – 11:55
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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*

*STATA Companion to Political Analysis  Second edition*
(or if you are not in Political Science you can also use - *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
Thompson 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

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<tr>
<th>Requirement</th>
<th>Weight</th>
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<tbody>
<tr>
<td>Midterm Exam</td>
<td>[weight = 20%]</td>
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<tr>
<td>Final Exam</td>
<td>[weight = 25%]</td>
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<tr>
<td>Homework Assignments</td>
<td>[total weight = 30%]</td>
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<tr>
<td>Research Project</td>
<td>[weight = 25%]</td>
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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 Homework Assignments will be taken from the STATA 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 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. 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.

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 word data is the plural of the word datum, and anyone who writes "the data is" deserves the resulting ridicule. Data ARE. (At least in the English speaking world.)
Aug 26: 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  

Sept 2 Labor Day Holiday  

Sept 9: Measurement: Levels, Reliability 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  
Do:  
Knoke et al: ch1 problems 5, 8, 9; ch 2 problems 1, 2, 3, 5  

Sept 16: Presenting & Summarizing Data II: Central Tendency and Dispersion, Skewness and Kurtosis.  
Read:  
Knoke et al. Ch 2 sections 2.4 to 2.8  
J Miller Ch. 4 (remainder)  
Do:  
Knoke et al: ch2 problems 6, 7, 8  

Lab 1 Chapters 1 and 2 due September 23  

Sept 23: Bivariate statistics, nominal data  
Read:  
Knoke Ch 5  
And crosstab reading from Pollock (moodle)  
Do:  
Knoke et al: ch5 problems 1,2,3,4 and 5  

Sept 30 Controlling for third variables by grouping  
Read  
Knoke et al Ch 7  
J Miller Ch 3 (pgs 33-40)  

Lab 2 Chapters 3 and 4 due Oct 4
Oct 7 Probability and Sampling
Gorini chapters 1,2,3,4,5

Lab 3 Chapter 5 due Oct 2

Oct 14 The Binomial Distribution/ Law of large numbers
Gorini chapters 6,7,10,11

Oct 21 The Normal distribution and samples
Gorini chapters 8,9
Read

Lab 4 Chapter 7 due Nov 4

Oct 28 Hypothesis testing
Abelson Ch4 “Styles of Rhetoric” (moodle)
Knoke et al Ch 3

Nov 4 Confidence intervals and t tests
Read
Knoke ch 4 section 4.3

Lab 5 chapter 6 Due Nov 11

Nov 11 Anova
Read
Knoke ch 4

Nov 18 Regression
Read
Knoke Ch 6

Nov 25 Multiple Regression
Read
Knoke et al Ch 8

Dec 2 Lab due, Chapter 9, 10

POLI 7963 Fall 2011
Abelson Ch5 "On Suspecting Fishiness" (moodle)