

University of Pennsylvania
Political Science 798-301

Quantitative Methods I

Professor Genie Baker

Class

Spring 2003
Thurs 12-3
285 McNeil

Office

Hours: Wed 1-3
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Course description: This course introduces one method of social science research: testing hypotheses through the use of statistics. Heavy emphasis will be given to the fundamental concepts behind statistical methodology; applied work in political science will be used as illustrations. Homework assignments will include statistical problems and computer assignments requiring the use of statistical software. Students should be prepared to present homework problems in class. Additionally, students will test a hypothesis and submit their results in the form of an original research report. Student papers will be presented on the final day of class.

Coverage will include descriptive statistics, basic probability theory, inferences concerning means, correlation, and an introduction to regression analysis.

Course requirements and evaluation:

Class Participation/Presentations:	20%
Mid-term Exam:	25%
Final Exam	25%
Paper	30%

Required Texts:

Thomas H. Wonnacott and Ronald J. Wonnacott (1990) *Introductory Statistics, 5th ed.*
New York: Wiley

Other assigned readings will be available in advance, in an envelope on my office door, for you to copy.

Recommended Texts:

William L. Hays (1994) *Statistics, 5th Ed.* Belmont, California: Wadsworth

Jan Kmenta (1986) *Elements of Econometrics, 2nd Ed.* NY: MacMillan

Course Sequence and Readings

Introduction

Explanation, Prediction, and Causal Statements
Confounding Variables
Randomized vs. Observational Studies

Reading

WW Chapter 1

Shanto Iyengar, Mark D. Peters and Donald R. Kinder (1982) "Experimental Demonstrations of the 'Not-So-Minimal' Consequences of Television News Programs." *American Political Science Review* 76, 4: 848-858.

Steven Rosen (1972) "War Power and the Willingness to Suffer," reprinted in John Vasquez and Marie Henehan (1999) *The Scientific Study of Peace and War*, chapter 11.

A. Describing variables and relationships between variables

1. Frequency distributions for discrete data

Univariate frequencies
Histograms
Crosstabulation
Controlling for a third variable

Reading

WW, Chapter 2, section 1

Angus Campbell, Philip E. Converse, Warren E. Miller and Donald E. Stokes (1964) *The American Voter*, abridged edition. New York: Wiley. Chapter 5: The Impact of Party Identification, pp. 67-86

Christopher H. Achen (2000) "Warren Miller and the Future of Political Data Analysis." *Political Analysis* 8,2: 142-146

2. Describing continuous variables

Measures of central tendency
Measures of dispersion
The normal approximation for continuous data
Percentiles

Reading

WW Chapter 2, through section 2.5.

David Freedman, Robert Pisani and Roger Purves (1998) *Statistics, 3rd ed.*
NY:Norton, Chapter 5

J. David Singer, Stuart Bremer and John Stuckey, "Capability Distribution,
Uncertainty and Major Power War, 1820-1965." Reprinted in John
Vasquez and Marie Henehan (1999) *The Scientific Study of Peace and
War*, pp. 37-50.

3. Describing Relationships between Continuous Variables I

Correlation

Introduction to Bivariate Regression

Reading

WW 15.1 A & B, 11.1, 11.2

J. David Singer, Stuart Bremer and John Stuckey, "Capability Distribution,
Uncertainty and Major Power War, 1820-1965." Reprinted in VH,
Chapter 2, pp. 51-74

Frank Whelon Wayman, (1984) "Bipolarity and War: The Role of Capability
Concentration and Alliance Patterns among Major Powers, 1816-1965."
Reprinted in VH, Chapter 8

4. Describing Relationships between Continuous Variables II

Controlling for Confounding Variables: Multiple Regression

Dummy variables

Reading

WW 13.1, 13.2, 13.4, 13.5, 14.1

B. Probability and Sampling

1. Basic Probability Theory

Probability of Simple Events, Compound Events

Conditional Probability and Independence

The Multiplication and Addition Rules

Reading

WW Chapter 3

Other reading, TBA

2. Chance Variability and Sampling

Chance processes

Expected values and standard errors

Population distributions, sample distributions, and *sampling* distributions

The normal approximation for probability histograms

Reading

Freedman, Pisani and Purves, Chapters 16-18

3. A Simple Application: Probabilities and Sample Proportions

Reading

Freedman, Pisani and Purves, Chapters 19-21

C. Inferential Statistics

1. Introduction to classical hypothesis testing

Properties of estimators

Jargon:

Null and alternative hypotheses

Significance tests

P-values

A simple application: Hypothesis tests for differences in proportions

Introduction to Confidence Intervals

Reading

WW Chapter 7, 9.3, 8.5

2. Significance tests using the t-distribution I

The one-sample t-test

Significance tests for correlation coefficients

Significance tests for regression coefficients

Substantive significance vs. Statistical significance

Reading

WW 8.1, 8.2, 9.1, 9.2, 12.2, 12.3, 13.3

3. Significance tests for differences of means, variances

Two-sample t-tests

Confidence intervals for differences in means

The F-tests for difference of variances

Aside on ANOVA

Reading

WW 8.3
Hays, 9.8-9.10
WW Chapter 9

4. Chi-squared tests for contingency tables

Reading

WW Chapter 17

D. Special Topics (if time permits)

1. The logic of maximum likelihood estimation

Reading

WW Chapter 18

2. An aside on logistic regression

Reading TBA

E. Presentation of Student Papers