Introduction to Quantitative Methods

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Course Description

This is an introductory course of quantitative methods for social scientists. It aims to prepare researchers to intelligently apply basic statistical methods for the purposes of empirical analysis. This course is thus a practical guide to statistical application. However, to become effective users of statistics, the students must learn elementary statistical concepts and theory, and be aware of the various assumptions of the methodology. The course will consequently combine simple exposition to statistical theory with practical use of statistical modeling. The course will alternate between lectures and practical lab sessions where students will be encouraged to apply the material while learning to program in the statistical software package R. While I do not expect students to be confident users of math, I do expect them to be keen learners. Learning quantitative methods requires continuous practice and repetition. This course steadily builds on previous material which is needed for understanding subsequent lectures. It is thus essential that you come to class, do all your readings on time, and complete all homework assignments.

Validation

- Homework assignments 30% (2 assignments, each worth 15%)

- Midterm exam 30%

- Final exam 40%

Readings

- Meier, K; Brudney J; Bohte J. (2006) Applied Statistics for Public and Nonprofit Administration. Thomson Wadsworth, 6th edition

- Lewis Beck, M. 1995. Data Analysis: An Introduction. Sage University Paper #103

- Fox, J. 1991. Regression Diagnostics. Sage University Paper #79

- Kmenta, J 1997 Elements of Econometrics. University of Michigan Press.

- Sarle W.S. "Measurement theory: Frequently asked questions" V3, 1997

Course Outline

Session 1: Where do Quantitative Methods Fit? Quantification and Measurement
Readings: 1) Meier et al. Chapter 2; 2) Warren S. Sarle "Measurement theory"

Session 2: Research design
Readings: 1) Meier et al. Chapter 3

Session 3: Descriptive Statistics
Readings: 1) Meier et al. Chapters 4, 5 and 6; 2) Michael Lewis-Beck "Univariate Statistics" in Data Analysis: An Introduction

Session 4: Sampling and Inference
Readings: 1) Kmenta, Jan "Introduction to Statistical Inference" in Elements of Econometrics; 2) Meier et al. Chapter 11

Session 5: Hypothesis testing
Readings: 1) Meier et al. Chapter 12
Homework 1 given out

Session 6: Relationships: Cross-tabulation and statistical control
Readings: 1) Meier et al. Chapters 15 and 17
Homework 1 due

Session 7: Midterm exam correction

Session 8: Correlation and Regression
Readings: 1) Meier et al. Chapter 18 and 19

Session 9: Multiple regression
Readings: 1) Meier et al. Chapter 21
Homework 2 given out

Session 10: Heteroscedasticity and Collinearity
Readings: 1) Fox "Collinearity" and "Non-constant Error Variance in Regression Diagnostics"
Homework 2 due

Session 11: Outliers, Non-normality, Problems of measurement etc.
Readings: 1) Fox "Outlying and Influential data" and "Non-normally distributed errors" in Regression Diagnostics

Session 12: Interaction Effects