

Research Methods and Quantitative Techniques in Public Management and Policy

ENVP U6310

Fall 2014

September 9 2014

Instruction Information

Lecturer: Guo Dong (guodong@columbia.edu)

Lecture Time: Tuesday 2:10-4:00pm

Location: IAB 410

Office Hours: Tuesday 11am-1pm, 1309 IAB, or by appointment

Teaching Assistant: Johannes Castner (jac2130@gmail.com)

Office Hours: Monday 11:30am – 1:30pm

Recitation Times: Monday 9-10:50 am, 510A IAB & Monday 4:10-6pm, 510A IAB

Departmental Research Assistant: Richa Maheshwari (rm3205@columbia.edu)

Office Hours: Wednesday 2-4pm

Course Description

This course is about social science research methods, with a heavy focus on quantitative techniques. Students in this course will learn to formulate research and policy questions amenable to empirical inquiry, and to identify and apply appropriate methods of measurement and analysis to answer these questions.

This course begins with the discussion on the formulation of research questions derived from policy and management objectives, followed by the collection and organization of data, and finally the presentation and analysis of facts.

This course emphasizes the conceptual understanding of statistics that can be readily applied in the practice of public management and policy. In terms of statistical methods, the course covers descriptive statistics for univariate and bivariate analysis, such as concepts and measures of central tendency, dispersion and contingency tables, and inferential statistical techniques including chi square, difference in means, and simple and multiple regression analysis.

To complement the lecture, students are introduced to the use of Stata, a computer-based data analysis tool. Later in the semester, the class is divided into groups to work on

problems relating to environmental policy and research. The groups formulate research questions and model, collect, code, clean, and analyze data. Towards the end of the class, students are required to present their findings, and produce an analytical report.

Course Expectation

The grade is based on class participation, five problem sets (in groups of 2), one short midterm exam, and one group based research project (with more details announced later), the results of which are to be presented in class.

The students are required to attend weekly lectures, and are expected to participate in weekly lab recitation sessions to develop proficiency with the statistical software Stata.

Grading

- 10% based on class participation
- 30% based on 5 problem sets
- 20% based on the midterm
- 40% based on research paper and presentation (10% on presentation, and 30% on the final paper)

The overall grade will be weighted as above.

However, SIPA policy dictates that a core course such as this one must have a GPA of between 3.2 and 3.4, with the goal of 3.3, a B+. As such, the overall grade will be curved appropriately, with B+ considered a good grade that signifies confidence in your ability to conduct independent work in a professional environment with quality.

A grade of B therefore signifies minor problems that need improvement, and B- signifies significant issues requiring improvement. A and A- are reserved for work that distinguishes itself by going above and beyond a simply correct answer.

Academic and Professional Conduct

The Code of Academic and Professional Conduct provides information on proper citations, plagiarism policies, and outlines SIPA's expectations of academic and professional conduct for its students, faculty, and staff. The program and its faculty will not tolerate academic dishonesty.

Read the Code of Academic and Professional Conduct, and the Dean's Discipline Policy and Procedures:

<https://sipa.columbia.edu/students/policies/academic-policies-and-regulations>

Readings

Required

- **Berman, Evan & XiaoHu Wang.** *Essential Statistics for Public Managers and Policy Analysts*. Third Edition.

Recommended

- **James H Stock & Mark W. Watson.** *Introduction to Econometrics*. Third Edition
- **David Moore & William Notz.** *Statistics: Concepts & Controversies*. Eighth Edition

Optional

- **Bryan F.J. Manly.** *Statistics for Environmental Science and Management*. Second Edition

Course Outline

Week 1 (Sept 2nd)

Introduction

Readings: Berman & Wang: Chapter 1-3 (p1-60)

- Introduction to statistics
- Introduction to scientific research methods
- Variables and their measurements
- Research design

Week 2 (Sept 9th)

Data Collection and Univariate Analysis

Readings: Berman & Wang: Chapter 5-7 (p80-133)

- Data collection
- Central tendency
- Measures of dispersion
- **First assignment**

Week 3 (Sept 16th)

Bivariate Analysis

Readings: Berman & Wang: Chapter 8 (p134-147)

- Contingency tables
- **First assignment due**
- **Second assignment**

Week 4 (Sept 23rd) **Probability**
Readings: will be posted on coursework after Lecture 3

- *Second assignment due*
- *Third assignment*
- *Research project groups finalized*

Week 5 (Sept 30th) **Statistical Inference 1 – Chi square**
Readings: Berman & Wang: Chapter 10 (p163-187)

- Hypothesis testing
- Chi-square
- Statistical significance
- **Third assignment due**

Week 6 (Oct 7th) **Statistical Inference 2 – Difference in Means**
Readings: Berman & Wang: Chapter 12-13 (p205-238)

- Difference in means: t-test
- Difference in means: ANOVA
- **Research project proposal due**

Week 7 (Oct 14th) *****Mid-term*** & Guest Lecture (tentative)**

- **Mid-term exam**
- Guest lecture on real world applications of statistical techniques

Week 8 (Oct 21st) **Statistical Inference 3 – Simple Regression**
Readings: Berman & Wang: Chapter 14 (p239-251)

- Simple Regression
- Correlation
- **Fourth assignment**

Week 9 (Oct 28th) **Statistical Inference 4 – Multiple Regression I**

Readings: Berman & Wang: Chapter 15 (p252-260)

- Introduction to multiple regression
- **Fourth assignment due**

Week 10 (Nov 4th) **Election Day (no class)**

Week 11 (Nov 11th) **Statistical Inference 4 – Multiple Regression II**
Readings: Berman & Wang: Chapter 15 (p261-276)

- Dummy independent variables
- Interactions
- Regression assumptions
- **Fifth assignment**

Week 12 (Nov 18th) **Statistical Inference 5 – Logistic Regression**
Other Techniques – Factor Analysis
Readings: Berman & Wang: Chapter 16 (p279-286); Part of Chapter 18 (p316-318)

- Logistic regression
- Introduction to factor analysis
- **Fifth assignment due**

Week 13 (Nov 25th) **Group Presentation**

Week 14 (Dec 2nd) **Group Presentation**

Week 15 (Dec 9th) *****Final paper due *****