PPOL 508-04: Quantitative Methods I
Georgetown Public Policy Institute

Fall 2003
Mondays & Wednesdays 10:15 – 11:30 a.m.
Southwest Quadrangle Classroom #131

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Office hours: Tuesdays,
             1-2 p.m. or by appointment

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Course Description
Quantitative Methods I is the first course in the three-course quantitative sequence at GPPI. This course introduces students to research methods and to descriptive and inferential statistics that are often used in public policy research. The course aims to provide students with a solid foundation for analyzing data, conveying analyses in convincing and appropriate ways, and developing further statistical skills. Thus, the emphasis is on understanding research questions and designs, describing data, and developing a core understanding of the scientific method in social science research.

Texts and Materials
                  • Morgan, Susan E., Tom Reichert, and Tyler R. Harrison. 2002. From Numbers to Words: Reporting Statistical Results for the Social Sciences (Boston: Allyn and Bacon).
                  • Course Packet (available from Kerry Pace).

Optional but recommended:

I recommend The Little SAS Book if you have no prior exposure to statistics and to SAS programming. I recommend Applied Statistics and the SAS Programming Language if you have some prior exposure to statistics or to SAS.


Sharing these optional books is a good idea. If want them you can probably find a good deal on a used copy through amazon.com, powells.com, alibris.com, or other sites (I did not ask the Georgetown Book Store to stock them).
Other materials:
Articles, notes, and other materials will be handed out in class. Data for the problem sets will be provided, or instructions for obtaining the data will be given. A hand-held calculator will be helpful. The statistical software package SAS will be used in this class (and also in Quant II and III). This software is available on the GPPI computers, but students can also purchase copies of SAS for their home computers for $25 from Hoya Computing (room G-36 in St. Mary’s Hall), Tel: (202) 687-0640. (http://uis.georgetown.edu/hoyacomputing/).

Course Requirements and Grading
Course grades will be based on the following:

- Class participation and effort 5%
- Problem sets
  - core problem sets (9) 25%
  - final project/paper 15%
- Midterm exam (Wednesday, October 22) 25%
- Final exam (Friday, December 12) 30%

Problem sets will be handed out on Mondays and will be due the following Monday in class. Students are strongly encouraged to work on these problem sets in study groups. However, each student must prepare and submit his or her own write-up for each problem set (including SAS programs and output when appropriate). Exams will be closed-book, closed-note. I will supply a sheet of formulas.

Letter grades will be based on the weighted average of all your coursework. I will curve the grades, but I do not have a predetermined distribution of final grades in mind.

COURSE OUTLINE (by week):

THE BIG PICTURE

August 27: Course Overview and The Big Picture
Policy analysis; basic research design and methods
- Healey chapter 1, pp. 1-9

No Class on Monday, September 1: University Holiday (Labor Day)
September 3: The Big Picture (cont.)
• Readings from last week, plus:

DESCRIPTIVE STATISTICS

September 8: Starting Points, & Describing Data I

September 8: Construct validity; defining variables; levels of measurement
  • Healey chapter 1, pp. 10-16

September 10: Percentages, ratios, and rates; tables, charts, and graphs
  • Healey chapter 2
  • Morgan et al., Chapters 1, 2, 8, and 9

September 15: Describing Data II (Pset 1 due)
Measures of central tendency and dispersion; the Normal curve
  • Healey chapters 3, 4, 5
  • Morgan et al., pp. 19-20; Chapter 3

INFERENTIAL STATISTICS: PROBABILITY AND BASICS OF HYPOTHESIS TESTING

September 22: Probability and Sampling (Pset 2 due)
Probability rules; joint, marginal, and conditional probabilities; independence; sampling
  • Healey chapter 6, pp. 142-147
September 29:  **Random variables and Sampling Distributions** *(Pset 3 due)*
Random variables, expected value, variance, sampling distributions for counts and proportions (the binomial distribution); sampling distribution of sample means (the normal distribution), Central Limit Theorem, standard error
- Runyon et al., pp. 246-250
- *Healey chapter*6 pp. 147-153

October 6:  **Hypothesis Testing** *(Pset 4 due)*
Confidence intervals; hypothesis testing; comparing a sample mean or proportion to a population mean or proportion; Z-tests and t-tests; two-tailed and one-tailed tests; p-values; Type I and Type II errors
- *Healey chapters* 7, 8
- Morgan et al.: pp. 13-14; 51-55

No Class on Monday, October 13:  **University Holiday (Columbus Day)**

October 15:  **Hypothesis Testing (continued)** *(Pset 5 due)*
Confidence intervals; hypothesis testing; comparing a sample mean or proportion to a hypothesized population mean or proportion; Z-tests and t-tests; two-tailed and one-tailed tests; p-values; Type I and Type II errors
- *Healey chapter* 8

October 20:  **Taking Stock**
Monday, October 21: Review in class

**MIDTERM EXAM: Wednesday, October 22 in class**

October 27:  **Hypothesis Testing: Are there Differences between Two Groups? (for Interval-Ratio Data)**
Comparing the difference between two sample means or proportions to a hypothesized population difference of means or proportions
- *Healey chapter* 9

November 3:  **Hypothesis Testing: Are there Differences between Three or More Groups? (for Interval-Ratio Data)** *(Pset 6 due)*
ANOVA
- *Healey chapter* 10
- Morgan et al., pp. 55-57, 59-60
November 10:  Hypothesis Testing: Are there Differences between Two or More Groups? (for Nominal and Ordinal Data) (Pset 7 due)
Bivariate tables; Chi-square tests
• *Healey chapter 11*

**INFERENTIAL STATISTICS: BIVARIATE ASSOCIATION**

November 17:  The Basics of Bivariate Association … and …
Analyzing Associations for Nominal and Ordinal Data
Cramer’s V; PRE; lambda; gamma
• *Healey chapters 12, 13, 14*
• Morgan et al., pp. 35-38

November 24:  Analyzing Associations for Interval-Ratio Data (Pset 8 due)
Correlation and simple regression
• *Healey chapter 15*
• Morgan et al., chapter 5; pp. 69-71

December 1:  Analyzing Associations for Interval-Ratio Data (continued) (Pset 9 due)
Simple regression
• *Healey chapter 15*
• Morgan et al., chapter 5; pp. 69-71

**FINAL EXAM: Friday, December 12: 4 – 6 p.m.**