Introduction to Methodology
Political Science 201
Spring 2004

Class Time: Tuesday & Thursday 01:00-02:30
Classroom: 143 Schaeffer
Instructor: Fred Boehmke
Office: 361 Schaeffer
Office Hours: Tuesday 14:45-16:00 & Wednesday 15:00-16:00, or by appointment.
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Course description:

This course is an introduction to the theory and use of statistics and probability for political scientists. It is designed to familiarize you with basic concepts in statistics, including moments, distributions, hypothesis testing and multivariate regression analysis. The objective of the class is to build a foundation in these topics and to introduce the application of these techniques in a variety of settings. Besides regular homework assignments, there will also be computer assignments intended to highlight the basic theoretical concepts in the context of both real-world and simulated data.

Textbooks:

There are two primary textbooks for the class, which will be available at Iowa Book and Supply:


Course Requirements:

Your grade will be based on three components.

1. Regular homework assignments and computer assignments designed to make sure everyone is following the class material. These will be very important in ensuring that you understand the material, but class attendance is also very important and will count towards this part of your grade. You are encouraged to work together on the written assignments, but everyone is required to hand in their own write-up. Late homework will not be accepted unless prior arrangements are made. (30%)

2. A midterm examination, format and date to be decided later. (30%)
3. A final examination, which will cover material from the entire course, but with an emphasis on the latter half. (40%)

**Topics to be Covered:**

Introduction  
Objective  
Course Outline  
What is Statistics and Why Should Political Scientists Care?

Beginning Concepts  
Introduction  
The Estimation Process  
Basic Formulas

Sampling Distributions  
Motivation  
Sampling Distribution of Vote Choice  
Sampling Distribution of Sample Mean

Set and Probability Theory  
Basic Set Theory  
Definitions  
Commutative and Associative Laws  
Counting  
Permutations  
Combinations  
Probability Theory  
Bayes Theorem  
Probability Functions  
Discrete Random Variables  
Continuous Random Variables  
Expectation

Distributions  
Binomial Distribution  
The Normal Distribution  
Sampling Distribution of Sample Mean

Hypothesis Testing  
Design and Evaluation of Tests  
Test Criterion  
Errors  
Power  
Quality of a Test  
Test Statistics  
Test for Equality of Means  
Estimation of  
The Chi-Square Distribution  
The t Distribution  
Test Concerning
Introduction To Regression  
  Population Regression Function  
  Linearity  
  Randomness  
  The Sample Regression Function  
  Estimation of the Regression Model  
  Assumptions of the Classic Linear Regression Model  
  Standard Errors of Least-Squares Estimates  
  The Gauss-Markov Thereom  
  Measuring Goodness of Fit: R-squared  

Regression and Normality  
  Probability Distribution of the Random Disturbances  
  The Normality Assumption  
  Properties of the OLS Estimators Under the Normality Assumption  

Hypothesis Testing  
  Interval Estimation  
  Hypothesis Testing  
  Construction of the Test Statistic  
  Analysis of Variance  
  Prediction of the Dependent Variable  
  Mean Prediction  
  Individual Prediction  

Multivariate Regression: The Three Variable Model  
  Notation and Assumptions  
  Interpretation and Meaning of Partial Regression Coefficients  
  OLS Estimates  
  Coefficients  
  Standard Errors  
  Properties of the Estimates  
  The Multiple Coefficient of Determination  
  Specification Bias  
  A Cornucopia of F Tests  
  For Overall Model Fit  
  As a Function of R  
  For Adding Variables  
  For Linear Coefficient Restrictions  

Other Information:  

Please visit the Political Science Department’s Website at http://www.uiowa.edu/~polisci.  
It is frequently updated regarding events and procedures in our department, changes in  
the Schedule of Courses, plus TA and faculty hours when available.  You may also find  
current information on pre-advising, and registration.  Our Vernon Van Dyke Computing  
Facility (Political Science ITC) ids located in Room 21 Schaeffer Hall.  Available hours  
are listed at our website and also posted outside Room 21 Schaeffer.