Methods of Political Analysis II  
PS 546/446 
Winter 2012 
Room: 301 GER 
Time: Tu, Th 2-3:20 pm 

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Objective: The objective of the course is to develop each student’s ability to read and conduct mainstream quantitative research. The focus will be on the topics in statistical theory and computing that are most relevant for applied research. Students will become well acquainted with the theory of multivariate linear regression and the open-source statistical language R. 

Philosophy: The pedagogical style of this course will be extremely modern in the sense that we will approach statistics as a means of uncovering the causal structure underlying observed phenomena. Towards this end we will stress basic principles of experimental research design. 

Grading: The course grade will be based on the following allocation of points. 

Participation: 10% 
Homework: 30% 
Midterm Exam: 30% 
Final Exam: 30% 

There will be 5 homework assignments, each worth 6% of the final grade. You may collaborate with other students as much as you like but you must write up your own answers on your own. HWs are due in my mailbox by the stated time. Late assignments will not be accepted. HWs will be assigned in weeks 2,4,6,8,10. 

The Midterm will take be taken in week 5. It is likely to be a take-home exam due two or three days after it is picked up—details forthcoming. The Final is likely to consist of an in-class open-book exam and a take-home computer exercise—details forthcoming. 

The final 10% of your grade consists of your participation score. This will be based on a variety of small assignments distributed throughout the term. 

Texts: During the first week of the term course packets will be available at Campus Copy on 13th Ave. You are required to obtain a course packet. Though not strictly required, there are three main textbooks we will draw from in this course: (1) Gujarati, (2) Chatterjee & Hadi and (3) Wooldridge. These are good standard reference (of which
there are many). The presentation of these texts is rigorous but pitched at the level of a novice statistics student.


**Statistical software**: Throughout the course we will use the free open-source statistical programming language R. Students should download the software as soon as possible from the R distribution website: [http://www.r-project.org/](http://www.r-project.org/). The software will be used to reinforce the student’s knowledge of statistical theory and master the basic skills of statistical computing—e.g., data manipulation, graphing, and significance testing.

We will make use of two sets of notes on R (of which there are many):


Farnsworth, Grant (2008). *Econometrics in R.*

The notes are available here: [http://cran.r-project.org/doc/contrib/Verzani-SimpleR.pdf](http://cran.r-project.org/doc/contrib/Verzani-SimpleR.pdf) and here: [http://cran.r-project.org/doc/contrib/Farnsworth-EconometricsInR.pdf](http://cran.r-project.org/doc/contrib/Farnsworth-EconometricsInR.pdf)

For sample data we will rely heavily on the Chatterjee et al data that is available from UCLA: [http://www.ats.ucla.edu/stat/stata/examples/chp/chpstata_dl.htm](http://www.ats.ucla.edu/stat/stata/examples/chp/chpstata_dl.htm).

I. Introduction and Overview (Week 1)

   A. Causation

   B. Research design
      - De Vaus (2001), pp. 1-16. “What is research design about?”

   C. What is applied statistics?
      - Fox (1997), pp. 3-23. (optional)

   D. Statistical computing
      - Verzani (2002), p. 1

II. Preliminary mathematical concepts (Weeks 1-2)

   A. Basic mathematical tools
      - Stewart (1999), pp. 11-38 “What is a function?”
**B. Random variables/Statistical distributions**
- Gonick & Smith (1993), Chps. 1-5 “Cartoon intro to probability theory”

**E. Matrix algebra**

**III. Statistical Inference and Hypothesis Testing (Week 3)**

**A. Fundamentals of probability theory**
- Winkler & Hays (1975), p. 118-164 “RVs, CDFs and PDFs”
- Wooldridge (2009), pp. 714-745. “Non-normal distributions/expected values/joint and conditional distributions”

**B. Statistical inference and hypothesis testing**

**IV. Linear Regression Analysis (Weeks 4-6)**

**A. Univariate linear regression**

**B. Multivariate linear regression**
- Wooldridge (2009), pp. 68-105. “t-tests for individual coefficients”

**C. Dummy variables, fixed effects, and random effects**
- Gujarati & Porter (2009) “Qualitative independent variables” p. ?

**D. General least squares**

**E. How to read a regression table**

**V. Generalized linear models (Week 7)**
- Wooldridge (2009), pp. 574-585 “Logits and Probits”

**VI. Panel Data and Hierarchical Models (Week 8)**
- Beck “Panel data notes w. R.E.s and F.E.s” (supplemental)
VII. What has not been covered? (Week 9-10)

A. Non-linear models

B. Model selection

C. Alternative estimation approaches
   1. Maximum likelihood estimation (MLE)
      Gujarati pp. 102-106
      Wonnacott & Wonnacott pp. 50-54, 147-148
   2. General method of moments (GMM)

D. Simultaneous equations models/IV estimation

E. Matching

F. Non-parametric models

G. Case selection for qualitative research