

G53.2127: Quantitative Political Analysis II
Draft Syllabus : Jan 12, 2003

Prerequisite: Students should have completed a basic course on regression analysis and be thoroughly familiar with the basic linear model, hypothesis testing, and the Gauss-Markov Theorem. Knowledge of matrix algebra and calculus is assumed (we will review as necessary).

Course Summary: This is a second course in regression analysis. It covers identification, estimating models with several equations, maximum likelihood estimation, and provides an introduction to markov-chain monte carlo.

Course Requirements

There will be approximately 4-6 problem sets. And there will be a final paper, that is to be presented at the end of the semester. Class attendance and participation are mandatory. There will be a lab section.

Your grade is determined as follows:

Problem Sets*:	50%
Paper:	50%

*Note: Your problem set grade is computed as the percentage of points you received from the total points available on all problem sets. Each problem set is worth anywhere from 30 to 80 points.

Required Books Recommended Books

- Gujarati, Damodar N. *Basic Econometrics*, 4rd edition, 2003, McGraw Hill. ISBN: 0071123423
- King, Gary. *Unifying Political Methodology*, University of Michigan Press, 1999 (reprint), ISBN: 0472085549.
- Lay, David C. *Linear Algebra and Its Applications*, 3rd edition, Addison-Wessely, ISBN: 0-201-70970-8.
- Ross, Sheldon. *Introduction to Probability Models*, 8th edition, 2002, Academic Press Incorporated, ISBN: 0125980558.

Topics Covered

1 Gilligan: Matrix Algebra - Weeks 1 and 2:

All readings are in David C. Lay. 2002. *Linear Algebra and Its Applications*. Third Edition. Addison Wesley. Available for purchase at the bookstore or (cheaper) at www.aw.com.

- Week 1:
 - Vector spaces, **READ:** Sections 1.3 and 1.4
 - Linear Dependence, **READ:** Section 1.7
 - Characterizations of Invertible Matrices, **READ:** Section 2.3
 - Dimension and Rank, **READ:** Sections 2.8 and 2.9
- Week 2
 - Eigenvectors and Eigenvalues, **READ:** Sections 5.1 and 5.2
 - Inner products and orthogonality Sections, **READ:** Sections 6.1 and 6.2
 - Quadratic forms, **READ:** Section 7.2
 - Look over for review: Least squares problems, **READ:** Section 6.5

2 Nagler: Identification and Simultaneous Equation Models

- Week 3
 - Simultaneous Equations and Identification
 - **READ:** Gujarati, Chapters 18 and 19.
- Week 4
 - IV Estimators and Simultaneous Equation Methods
 - **READ:** Gujarati, Chapter 20.
 - **READ:** Jacobson (*APSR*, 1978)
 - **READ:** Greene and Krasno (*AJPS*, 1988)
- Week 5
 - Intro to Gauss
 - **READ:** TBA

3 Gordon: Maximum Likelihood Estimation

- Week 6: Probability theory: Random variables, distributions, expectations, and Bayes Rule
 - **READ:** Ross, ch. 1: all; ch. 2: 2.1-2.4 closely, skim 2.5 and 2.7, skip 2.6 and 2.8
- Week 7: Maximum likelihood as a method of inference
 - **READ:** King, chs. 1-3 (skim; ch. 3 will be review); ch. 4 closely
- Week 8: Applications: Logit, probit, ordered probit
 - **READ:** King, ch. 5: 5.1-5.4
- Week 9: Applications: Censored regression, count models
 - **READ:** King, ch 5: 5.5-5.10; ch. 9

4 Smith: Bayes and MCMC

- Week 10: The Bayesian perspective: Bayes rule and Markov chains.
 - Simulating marginal densities from conditional densities: the basic linear model
 - Lab: estimating the linear model
- Week 11: MCMC models: Limited dependent variables (probit), hierarchical models, and panel models.
 - Bayesian model testing: Bayes factors.
 - Lab: estimating models with auxiliary parameters, probit.

5 Student Papers

- Weeks 12-14
 - Student Presentations and Poster Session