

University of Illinois  
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Econ 574

Department of Economics  
Roger Koenker

## Advanced Econometrics I Course Prospectus

The field sequence 574-575 in econometrics is designed to give students a working knowledge of a broad array of current topics in econometric theory and prepare them for empirical applications near the research frontier. In the first course, 574, we will focus the first half of the course on asymptotic methods and the study of the large-sample behavior of econometric procedures supplemented by an introduction to Monte Carlo and related computationally intensive methods. The second half of the course will be devoted to recent developments in semi-parametric methods in econometrics, focusing primarily on topics relevant to microeconomic applications

### Suggested Texts:

Tony Lancaster (2005) *Introduction to Modern Bayesian Econometrics*, Blackwell.

A.W. van der Vaart *Asymptotic Statistic*, Cambridge.

### Recommended Supplementary Texts:

Amemiya, T. (1985) *Advanced Econometrics*, Harvard.

Davidson, R. and MacKinnon J.G. (2003), *Estimation and Inference in Econometrics*, 2nd ed., Oxford U. Press.

**The course is based mainly on the lecture notes and traditionally hasn't really relied much on a text.** I will again try to introduce more Bayesian material and the new Lancaster book is being suggested so that students have access to an authoritative viewpoint from a true-believer and don't have to rely entirely on my semi-heretical presentation. I will also introduce empirical Bayes methods as a middle ground between classical frequentist methods and formal, subjectivist Bayesian methods. The van der Vaart book has become a standard reference in statistics. Readings for the second half of the course will be distributed in class. Another page of supplementary texts is available from the class webpages. Regular problem sets, a brief research paper and take home final exam will be required. There will be no midterm exam. The problem sets will attempt to intermingle theoretical, empirical and computational exercises. Rather than lecture format for the class meetings, I plan to rely more on student participation than in previous years.

## Outline

### 1. Introduction to Asymptotic Theory and Monte-Carlo Methods

In the first part of the course we will attempt to interweave asymptotics and monte-carlo introducing the basic techniques of both approaches and illustrating their application on a wide variety of problems of estimation and inference including

location/scale estimation  
(generalized) linear models (exponential family models)  
(quasi) maximum likelihood and related methods of inference

Along the way we will revisit, or encounter for the first time in some cases: modes of convergence, laws of large numbers, central limit theorems, stochastic equicontinuity, and weak convergence. The basic tools of the monte-carlo trade will also be introduced including some attention to design of experiments, variance reduction techniques and a brief introduction to density estimation. Particular attention will be paid to monte carlo methods for evaluation of inference procedures.

### 2. Semi-Parametric Methods in Econometrics

The second half of the course will be devoted to recent developments in semi-parametric methods of estimation and inference. These methods seek to relax the stringent assumptions required to justify the strictly parametric models employed in classical econometrics. We will consider a selection of the following topics.

- (a) Nonparametric density estimation
- (b) Nonparametric regression
- (c) Quantile regression
- (d) Semiparametric discrete choice models
- (e) Semiparametric survival analysis
- (f) Mixture Models and Empirical Bayes Methods