

Dept of Economics  
UNC-Chapel Hill

Fall 2007

Syllabus Econ 870  
ADVANCED ECONOMETRICS

**Meeting time and place:**  
MWF 3:00-4:15pm, Gardner 308

**Professor:**  
Eric RENAULT

**How to reach me:**

My office is located in Gardner Hall 300G. My office phone number is #6-5326.  
I will hold office hours on Tuesday from 2:30pm to 4:30pm.  
My email address is [renault@email.unc.edu](mailto:renault@email.unc.edu)

**Prerequisites:**

Economics 770 “Introduction to Econometric Theory”  
Economics 771 “Econometrics”  
Mathematics 147 “Linear Algebra”

Econ 770 and Math 147 have given you the statistical and mathematical tools necessary to understand this course. Econ 771 has made you familiar with the practice of econometrics on actual data sets. It is now time to go further on the modern developments of econometrics, including statistical inference for nonlinear, nonparametric or dynamic models. This requires a mathematically rigorous treatment of asymptotic distribution theory.

**Goals:**

This course is conceived primarily to give to any researcher in quantitative economics a very firm understanding of why certain econometric methods work and to give students the background for developing new methods. This is the reason why the course contains proofs or outlines the proofs of many assertions, focusing on the role played by the assumptions with economic content. Complementary readings will be proposed to students interested in doing research in econometric theory. The data configurations we have in mind are large cross sections or time series. Almost all of the econometric theory we present is asymptotic, which means that it is exactly true only in the limit as the sample size tends to infinity.

**Evaluation:**

The grade for the course will be based on three homework sets, each with weight of 10%, a midterm exam (30%) and a final exam (40%).

**Homework sets:** They require that you derive theoretical results from theorems proven in class. The focus will be not only on mathematical derivations, but also on discussion of modeling issues and relevance of assumptions.

**Midterm exam:** The midterm will have the same format as the homework. Please don't neglect questions about discussion or interpretation of results which can always be solved with non-technical, albeit rigorous arguments, even when associated mathematical derivations have been skipped.

**Final exam:** The final will be cumulative, i.e. cover all the chapters since the beginning of the semester. The format is similar to homework and midterm.

The use of personal handwritten notes and of Hansen's textbook (required textbook below) will be allowed during the exams. No other book will be allowed.

The grading will be numerical (the maximum grade being 20), which will then be converted to H, P, L or F.

**Teaching Assistant:**

Mike Aguilar

[maguilar@email.unc.edu](mailto:maguilar@email.unc.edu)

Recitation on Friday, 10:00 to 10:50am, Gardner 009.

**Textbook and Readings:****Required:**

Bruce E. Hansen (2007), *Econometrics*, available at <http://www.ssc.wisc.edu/~bhansen/>  
Still work in progress and a bit too succinct for this course. However, very useful starting point.

**Recommended:**

Jean-Pierre Florens, Velayoudom Marimoutou and Anne Peguin-Feissolle (2007), *Econometric Modeling and Inference*, Cambridge University Press, series "Themes in Modern Econometrics". Demanding but rewarding reading. The closest to the spirit of the course.

### **Other books of interest:**

Any course in econometric theory. Examples, among many possible, are:

Fumio Hayashi (2000), *Econometrics*, Princeton University Press.  
Covers all the important topics in econometrics (except non-parametric estimation and simulation-based methods) in a succinct manner with nice economic examples, both in time-series and cross-section. The exposition is accessible to students who have a working knowledge of very basic linear algebra and probability theory.

James Davidson (2000), *Econometric Theory*, Blackwell Publishers.  
Table of contents similar to Hayashi, but with much more focus on the state-of-the-art in asymptotic distribution theory. Useful to get the details of the mathematical proofs and assumptions that are skipped in Hayashi.

Herman J. Bierens (2004): *Introduction to the Mathematical and Statistical Foundations of Econometrics*, Cambridge University Press, Series “Themes in Modern Econometrics”.  
A very useful book to review the background of probability theory and mathematical statistics supposed to be learnt in Econ770 and even more.

### **Overview of the course:**

1. Estimation by Maximization and the Method of Moments
2. Asymptotic Tests
3. Conditional Expectation and Univariate Regression
4. GLS, Heteroskedasticity and Multivariate Regression
5. Conditional Moment Restrictions
6. Simulation Methods
7. Nonparametric Methods and Empirical Likelihood
8. Simultaneity
9. Nonparametric Estimation of the Regression