Roger Koenker Fall 2011

UNIVERSITY OF ILLINOIS
Department of Economics

Econ 508
Applied Econometrics

Course Outline

This course is intended to be an introduction to specification, estimation, prediction, and evaluation of econometric models. After a *brief* review of some aspects of the single equation linear regression model we will consider systems of linear equations, instrumental variable estimation, and simultaneous equation models. The focus will then shift to nonlinear models and we will study: nonlinear least-squares, discrete choice models, censored regression models and survival/duration models. The last segment of the course will treat semi-parametric methods including method of moments, quantile regression, and (perhaps) some simulation estimation. Throughout we will try to emphasize the essential interplay between econometric theory and economic applications.

The plan is to devote roughly one class in four to discussion of problem sets. Brief student presentations will be expected in the latter sessions. Cooperation among students on problems is strongly encouraged, but I expect that joint work will be clearly acknowledged in written assignments. *The size of groups doing joint work on the problem sets will be limited to no greater than three.* Grading on the written problem sets and on the class presentations will be based on clear exposition of empirical results and the quality of the interpretation, not just "getting the right numbers in the computer output". You should think of the problem set assignments as opportunities to begin to develop a style of writing empirical papers. Like any writing skill, one can best learn to write by careful reading of related material. An excellent resource on technical writing is the "transcript" of the course given by Don Knuth, author of *The Art of Computer Programming*, at Stanford, and available from the American Math Society in softcover form. More cheaply it is also available as a tex file on the web at `http://www-cs-faculty.stanford.edu/~knuth/klr.html` this can be made into a pdf file using the usual tex magical incantations.[1]

In the first few problem sets you should think of the questions as asking you to write a paragraph, or a footnote, to explain a particular aspect of the analysis. In later problem sets you will have more scope for a broader written perspective: in fact, the last two problem sets will be more like writing mini-research papers. Likewise the class presentations you should consider as mini-seminars, just 2-5 minutes using one or two transparencies, but attempting to make a concise interpretation of the relevant material, making effective use of supporting numerical and graphical evidence. We will discuss more specific arrangements for these presentations in class. This is an essential skill in any scientific discipline. For these minipresentations you will be expected to upload small pdf files with a few "slide" images that can be project on the classroom screen. Further details about how to submit these files will be provided in the TA sessions. I am aware that there is an historical memory of prior answers to these problem sets. I plan to make more of an effort to modify some of the questions, but grading of the problems sets will reward innovation and answers that try to venture beyond the routine responses. Grading will be based on an aggregation of a.) midterm and b.) final exam grades, and c.) scores on the written problem sets, and class presentations. The relative weights of these components will be roughly 30, 40, and 30 percent. The midterm will occur on October 27.

I plan to emphasize Bayesian methods somewhat more strongly than I have in past years, and hope to introduce some Bayesian methodology into the problem sets as well.

[1] The file is in, not surprisingly, Knuth's "pure TEX" so this incantation entails: tex mathwriting; dvips mathwriting; ps2pdf mathwriting.ps. I highly recommend starting to learn LATEX, a convenient dialect of TEX, which has become the *lingua franca* of mathematical writing.

One of my continuing interests is to increase the level of awareness about the importance of computational methods and *reproducibility* in econometric research. Thus you should always be prepared to document *exactly* how you arrived at your results. I will have more to say about this in class. The recommended software for the computational aspects of the course is Stata or R. R is an open source project is available without charge from `http://cran.r-project.org/`. R is highly recommended as a much more flexible and modern approach to data analysis; but Stata is also widely used and therefore an important skill.

An important aspect of the course are the TA sessions that will be run this year by Jiaying Gu. These TA sessions are very important opportunities to discuss both theoretical and practical aspects of the course material. Another important line of communication for the course is the Web. Many routine aspects of the course will be handled on the web site: `http://www.econ.uiuc.edu/~econ508/ec508.html`. This will include pdf versions of the lectures, problem sets, as well as software, data, etc.

Week	Date	Topic	Readings*
1.	Aug 25	Household Demand Models	W.2 DM.2
2.	Sept 2	Dynamic Models and Model Selection	JdN.7.1, H.5 H.7-8
3.	Sept 8	Delta Method and Bootstrap	JdN.11.3
4.	Sept 15	Errors in Variables and IV's	H.2.11, W.5, JdN.5.5
5.	Sept 22	Simultaneous Equations	W.8-9, JdN 5.5, H.9
6.	Sept 29	VARS, Causality & Cointegration	D.3, JdN.8-9
7.	Oct 6	ARCH and Stochastic Volatility Models	JdN.6.9,H.6.9
8.	Oct 13	Panel Data I	W.10, HT, JdN.12
9.	Oct 20	Panel Data II	W.11
10.	Oct 29	Binary Response & Count Models	W.15, W.19, JdN.13
11.	Nov 3	Sample Selection & Censoring	W.16-17, JdN.13
12.	Nov 10	Survival Analysis Models	W.20
13.	Nov 17	Quantile Regression	Handout
14.	Dec 5	Non-parametric Regression	JdN 11.5

$*$ Weeks are identified by the date on Thursday of each week. This schedule is a rough guide to the timing of topics in the course. Readings indicate Section numbers in Harvey's *Econometric Analysis of Time Series*, Wooldridge's *Econometric Analysis of Cross section and Panel Data*, and JdN Johnston and DiNardo, *Econometric Methods*. DM refers to Deaton and Muellbauer (1980) *Economics and Consumer Behavior*, and D refers to Deaton (1992) *Understanding Consumption*. HT is Hausman and Taylor, "Panel Data and Unobservable Individual Effects" *Econometrica*, (1981) 1377-1398. Other readings will be assigned or suggested in class. The primary reading for the course will be the lecture notes that will be available from the class website.