Department of Economics **Professor Dale J. Poirier**
University of California, Irvine **September 27, 2007**

ECON 220A / 221A
Statistics and Econometrics I
Fall, 2007

SYLLABUS

Time and Location: ECON 220A meets Tuesday and Thursday, 11:00am - 12:20pm, in SSPA 3132. ECON 221A (Laboratory) meets Friday, 11:00am - 12:20pm in SSL 119. Students ***must*** enroll in both 220A and 221A. The instructor for the lab is Hao Jia (hjia@uci.edu). His office hours will be determined during the first lab.

Office Hours: W: 10:00am - 11:45am; SSPA 4175; telephone: (949) 824-3186; email: dpoirier@uci.edu.

Course Description: This course covers probability and mathematical statistics necessary to prepare students for econometric study and empirical work. Topics include probability theory, distributions, sampling, and point estimation.

Pre-requisite: Graduate standing or consent of the instructor.

Grading: There are two ***open-book*** exams worth 1/3 and 2/3, respectively. Homework problems from class notes are covered in weekly laboratory sessions. Although homework assignments are ***not*** collected, their mastery is essential for satisfactory completion of the exams.

Course Materials:

> Poirier, D. J., 1995, *Intermediate Statistics and Econometrics: A Comparative Approach* (MIT Press).

Supplementary Course Materials: The following books may be helpful.

1. Abadir, K. M. And J. R. Magnus, 2005, *Matrix Algebra*, Cambridge University Press.
2. Bierens, H. J., 2004, *Introduction to the Mathematical and Statistical Foundations of Econometrics* (Cambridge University Press).
3. Casella, G. and R. L. Berger, 2002, *Statistical Inference* (Duxbury, second edition).
4. DeGroot, M. H. and M. J. Schervish, 2001, *Probability and Statistics* (Addison-Wesley).
5. Hogg, R. V. and A. T. Craig, 1995, *Introduction to Mathematical Statistics* (Macmillan, fifth edition).
6. Larsen, Richard J. And Morris L. Marx, 1986, *An Introduction to Mathematical Statistics and Its Applications* (Prentice-Hall, second edition).

7. Lehmann, E. L. and G. Casella, 1998, *Theory of Point Estimation*(Springer, second edition).
8. Mood, A. M., F. A. Graybill and D. C. Boes, 1974, *Introduction to the Theory of Statistics* (McGraw-Hill, third edition).
9. Ross, Sheldon M., 1997, *Introduction to Probability Models* (Academic Press, sixth edition).
10. Wackerly, D. D., W. Mendenhall III, and R. L. Scheaffer, 2002, *Mathematical Statistics with Applications* (Duxbury, sixth edition).

Overview: ECON 220A/221A is the beginning of the econometrics sequence for Ph.D. candidates. It is aimed primarily at non-specialists in econometrics, but together with out-of-class counselling, it also serves the needs of specialists in econometrics. ECON 220A/221A - ECON 220D/221D provide a ***minimal*** coverage of econometrics for contemporary Ph.D. candidates in economics.

Advice: ECON 220A is not overly demanding in terms of mathematical technique. Only elementary matrix algebra and standard calculus concepts are employed. ECON 220A, however, does demand conceptual thinking and abstraction. Students are exposed to many new statistical concepts and mastery of such concepts requires effort by students two areas. Firstly, required readings ***must be done before lectures***. The text was developed precisely for this type of course, and it will be followed verbatim. Thus a minimum of note taking is required and students are expected to ask questions in lectures to clarify areas of confusion. Secondly, statistical concepts cannot be grasped without engaging in ***extensive*** problem solving. Numerous other exercises are included in the class notes to stimulate discussion among students both inside and outside class. In the past students have found the formation of ***study groups*** to be a valuable experience, and the numerous assigned exercises are provided in part to encourage such formation.

CLASS TOPICS, READINGS, AND HOMEWORK PROBLEMS

Notation: Exercises in **bold** are most important.

0. Introduction

Th Sep. 2 Introduction.
Poirier: Sections 1.1-1.3

F Sep. 28 Lab: no meeting

I. Matrix Algebra Review

Tu Oct. 2 Matrix algebra review.
Poirier: Appendices A and B

II. Basic Concepts

Th	Oct. 4	Interpretations of probability. Poirier: Section 2.1
F	Oct. 5	Laboratory: Exercises A.4.10, A.7.1, 2.1.2, 2.1.3, **2.1.18, 2.1.19**, 2.1.26
Tu	Oct. 9	Random variables; distribution, mass, and density functions; univariate mathematical expectation. Poirier: Sections 2.2-2.3
Th	Oct. 11	Joint and conditional distributions; statistical independence; multivariate mathematical expectation. Poirier: Sections 2.4-2.6
F	Oct. 12	Lab: Exercises 2.2.2, 2.2.5, 2.3.4, **2.3.8**, **2.3.10**, **2.4.4**, **2.4.8**, 2.4.9, 2.5.5, 2.5.7, **2.5.9**
Tu	Oct. 16	Population regressions and partial correlations; inequalities. Poirier: Sections 2.7-2.8
Th	Oct. 18	Univariate distributions. Poirier: Sections 3.1-3.3
F	Oct. 19	Lab: Exercises 2.6.5, 2.6.10, 2.7.1, 2.7.2, **2.7.4**, **2.7.13**, 3.2.15, **3.3.17**
Tu	Oct. 23	Multivariate distributions. Poirier: Sections 3.4-3.5
Th	Oct. 25	Distributions of functions of random variables. Poirier: Sections 4.1-4.5
F	Oct. 26	Lab: Review old midterm exams; Exercises **3.4.9**, 3.4.18, **3.4.22**, **3.4.32**, 4.2.5, 4.4.7, **4.5.1**, 4.5.9
Tu	**Oct. 30**	**MIDTERM EXAM (open-book; 1/3 of final grade; covers through Oct. 26)**

III. Sampling

Th	Nov. 1	Sample moments; sampling distributions; order statistics. Poirier: Sections 5.1-5.4
F	Nov. 2	Lab: Review midterm; Exercises **5.2.2**, 5.2.5, 5.3.1, **5.3.8**, 5.4.8, 5.4.9

Tu	Nov. 6	Stochastic convergence; laws of large numbers; central limit theorems. Poirier: Sections 5.5-5.7
Th	Nov. 8	Subjectivist view of sampling. Poirier: Sections 5.8
F	Nov. 9	Lab: Exercises **5.5.1**, **5.5.2**, 5.5.9, 5.5.16, 5.7.3

IV. Programming

Tu	Nov. 13	MATLAB: data handling and graphics.
Th	Nov. 15	MATLAB: optimization.

V. Estimation

F	Nov. 16	Lab: Exercises 6.1.1, **6.1.3**, 6.1.6. MATLAB exercises
Tu	Nov. 20	Sufficiency; Likelihood and Stopping Rule Principles. Poirier: Sections 6.1-6.2
Th	**Nov. 22**	**Thanksgiving (no class)**
F	**Nov. 23**	**Lab (no meeting)**
Tu	Nov. 27	Sampling properties of estimators in small samples. Poirier: Section 6.3
Th	Nov. 29	Frequentist point estimation; sampling properties of estimators in large samples. Poirier: Sections 6.4-6.5
F	Nov. 30	Lab: Exercises 6.3.3, **6.3.4**, **6.3.5,** 6.3.13, 6.3.24, **6.4.4**, 6.5.1, 6.5.11
Tu	Dec. 4	Estimation: method of moments, maximum likelihood. Poirier: Section 6.6
Th	Dec. 6	Estimation: method of moments, maximum likelihood. (continued).
F	Dec. 7	Lab: Exercises **6.6.2**, **6.6.3**, **6.6.6**, **6.6.7**, 6.6.16, 6.6.18, and old final exams.
T	**Dec. 11**	**FINAL EXAM (open-book; 2/3 of final grade; covers full course), 10:30am - 12:30pm**.