Department of Economics **Professor Dale J. Poirier**
University of California, Irvine **January 11, 2006**

ECON 220B / 221B
Statistics and Econometrics II
Winter, 2006

SYLLABUS

Time and Location: ECON 220B (Lecture) meets Tuesday and Thursday, 11:00am - 12:20pm, in SSPA 3132. ECON 221B (Laboratory) is currently scheduled to meet Friday, 3:30-4:50pm in SSL 206.

Office Hours: W: 10:00am - 11:40am; SSPA 4175; telephone: (949) 824-3186; e-mail: dpoirier@uci.edu.

Course Description: This course takes up where ECON 220A leaves off. Continuing in the likelihood perspective, it begins with Bayesian point estimation. Then interval estimation and hypothesis testing are covered from both frequentist and Bayesian perspectives. This is followed by a general discussion of prediction. Finally, all these techniques are applied to the standard linear regression model. While potential complications in the standard linear model are noted, the analysis concentrates on the linear model under ideal conditions. This course is primarily theoretically oriented, however, empirical implementation is addressed in computer homework assignments directed toward applied economic problems.

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:

Required:

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

Articles listed in the syllabus are all available on JSTOR.

Supplementary Course Materials: The following books may be helpful.

1. Bauwens, L., M. Lubrano, and J.-F. Richard, 1999, *Bayesian Inference in Dynamic Econometric Models* (Oxford University Press).
2. Bernardo, J. M. and A. F. M. Smith, 1994, *Bayesian Theory* (Wiley).
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, third edition).
5. Geweke, J., 2005, *Contemporary Bayesian Econometrics and Statistics* (Wiley).
6. Greene, W. H., 2003, *Econometric Analysis* (Prentice Hall, fifth edition).
7. Hogg, R. V. and A. T. Craig, 1994, *Introduction to Mathematical Statistics* (Prentice Hall, fifth edition).
8. Koop, G., 2003, *Bayesian Econometrics* (Wiley).
9. Lancaster, T., 2004, *An Introduction to Modern Bayesian Econometrics* (Blackwell).
10. Leamer, E. E., 1978, *Specification Searches: Ad Hoc Inference with Nonexperimental Data* (Wiley).
11. Lehmann, E. L. and G. Casella, 1998, *Theory of Point Estimation* (Springer, second edition).
12. Mood, A. M., F. A. Graybill and D. C. Boes, 1974, *Introduction to the Theory of Statistics* (McGraw-Hill, third edition).
13. O'Hagan, A., 1994, *Kendall's Advanced Theory of Statistics, Vol. 2B, Bayesian Inference* (Halsted Press).
14. Spanos, A., 1986, *Statistical Foundations of Econometric Modelling* (Cambridge Press).
15. Zellner, A., 1971, *An Introduction to Bayesian Inference in Econometrics* (Wiley).

Overview: ECON 220B/221B is the second quarter of the econometrics sequence for Ph.D. candidates. It is aimed primarily at non-specialists in econometrics, but together with out-of-class counseling, 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 220B is not overly demanding in terms of mathematical technique. Only elementary matrix algebra and standard calculus concepts are employed. ECON 220B, however, does demand conceptual thinking and abstraction. Students are exposed to many new statistical concepts and mastery of such concepts requires effort on the student's part in two areas. Firstly, required readings ***must be done before lectures***. The text was developed precisely for this type 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 is designed in part to encourage such formation.

CLASS TOPICS, READINGS, AND HOMEWORK PROBLEMS

Notation: T = Tuesday, Th = Thursday. Exercises in **bold** are most important.

I. Bayesian Point Estimation

F Jan. 6 Postponed until March 17, 2006

Tu Jan. 10 Review the subjectivist view of sampling; Bayesian inference.
Poirier: Sections 5.8 and 6.7
Poirier and Tobias, 2005, "Bayesian Econometrics," in *Palgrave Handbook of Econometrics*, forthcoming.
Koop: Chapter 1
Lancaster: Chapter 1

Th Jan. 12 Bayesian point estimation (continued).

F Jan. 13 Laboratory: Exercises 6.7.2. 6.7.3, **6.7.4**, 6.7.5, **6.7.10**, 6.7.11, **6.7.16**

Tu Jan. 17 Choice of prior.
Poirier: Section 6.8
Geisser, S., 1984, "On Prior Distributions for Binary Trials (with discussion)," *American Statistician*, Vol. 38, 244-251.
Kass, R. E. and L. Wasserman, 1995, "The Selection of Prior Distributions by Formal Rules," *Journal of the American Statistical Association* 91, 1343-1370.

II. Frequentist and Bayesian Interval Estimation

Th Jan. 19 Frequentist and Bayesian interval estimation; reflections on conditioning.
Poirier: Sections 6.9-6.10

F Jan. 20 Laboratory: Exercises 6.7.18, **6.7.22**, **6.7.26, 6.8.2**, 6.8.3, 6.8.6, 6.9.6, **6.9.8**

III. Testing

Tu Jan. 24 Frequentist hypothesis testing; asymptotic hypothesis testing.
P: Sections 7.1-7.3

Th Jan. 26 Frequentist hypothesis testing; asymptotic hypothesis testing. (continued).

F Jan. 27 Laboratory: Exercises **7.2.1**, 7.2.2, 7.2.3, 7.3.1

Tu Jan. 31 Bayesian hypothesis testing.
P: Section 7.4
Kass, R. E. and A. E. Raftery, 1995, "Bayes Factors," *Journal of the American Statistical Association* 90, 773-795.

Th Feb. 2 Bayesian hypothesis testing (continued); p-values.
P: Sections 7.5-7.6

F Feb. 3 Laboratory: Exercises **7.4.1**, 7.4.4, 7.4.5. Review previous midterm exams.

Tu Feb. 7 Laplace expansions; Monte Carlo integration
Appendix C.2
Handouts, exercises.

Th Feb. 9 **MIDTERM EXAM** (open-book, ⅓ of final grade)

F Feb. 10 Laboratory: Review midterm and discuss computer homework assignment.

IV. Regression Analysis

Tu Feb. 14 Introduction to regression.
P: Section 9.1

Th Feb. 16 OLS
P: Sections 9.2

F Feb 17 Laboratory: Exercises 9.1.2, 9.1.7, 9.2.8, **9.2.13**, 9.2.16, **9.2.18**, 9.2.20

Tu Feb. 21 RLS, MLE; confidence intervals.
P: Sections 9.3-9.5

Th Feb. 23 Frequentist hypothesis testing.
P: Sections 9.6

F Feb. 24 Laboratory: Exercises 9.3.4, 9.3.9, **9.4.1**, 9.5.2, 9.6.3, 9.6.5, **9.6.9**, 9.6.13

Tu Feb. 28 Pretesting; dummy variables.
P: Sections 9.7-9.8

Th Mar. 2 Bayesian estimation in the standard linear model.
P: Section 9.9

F Mar. 3 Laboratory: Exercises **9.7.1**, 9.7.9, **9.8.3**, **9.9.4**, 9.9.8, **9.9.12**

Tu Mar. 7 Bayesian estimation in the standard linear model (continued); Bayesian testing.
P: Section 9.10
Bauwens, Lubrano, and Richard: Chapter s 2, 4
Geweke, J., 1986, "Exact Inference in the Inequality Constrained Normal Linear Regression Model," *Journal of Applied Econometrics*, Vol. 1, 127-141.
Koop: Chapters 2-4
Lancaster: Chapter 3

Th Mar. 10 Prediction.
P: Sections 8.1-8.6, 9.11

F Mar. 11 Laboratory: Exercises 8.2.6, 8.7.1, **9.11.7**, 9.11.9. Review past final exams.

Tu Mar. 14 Goodness-of-fit, sample partial correlation, multicollinearity.
P: Sections 9.12-9.14

Th Mar. 16 Model building.
P: Sections 10.1-10.9; Exercises 10.3.6, 10.3.12

F Mar. 17 Laboratory: Exercises **9.12.1**, 9.13.1, 9.14.2, 9.14.10, 9.14.12, **9.14.17**

Tu Mar. 21 **FINAL EXAM** (open-book; bring computer homework output; ⅔ of final grade), 10:30am - 12:30pm.