Economics 7818
Syllabus

Office Hours (room 203):
Monday 1-3
Thursday 9-11

Economics 7818 is a course in intermediate econometrics for PhD students and for Master's students specializing in the field. Since this may be the only course some of you will take in econometrics, we will attempt to cover both theoretical and practical topics essential for applied work in econometrics.

The prerequisites for Economics 7818 are a course in economic statistics (such as Economics 3818) and topics in matrix algebra (as presented in Economics 7808). Our text also provides extensive coverage of the essentials of probability and statistics, and you are encouraged to read and work problems in these chapters to refresh your background in these areas (see Topics and Readings, below). Appendix B of the text also summarizes the main definitions and theorems of matrix algebra that we will need. An exception is the topic of characteristic roots and vectors, for which you should consult pages 326-330 of Alpha Chiang's *Fundamental Methods of Mathematical Economics* (3rd edition).

You will be actively involved with computers in this course. Computer exercises and instruction will be based on the TSP econometrics package, which is available in both VAX and PC versions. You will be provided with accounts on the VAX cluster of machines, which we will also use for communication. You will be provided with an orientation on the use of the VAX system and its electronic mail feature. Instruction on TSP will be provided through a series of econometrics exercises that are described in the TSP Laboratory Manual, available for purchase at Kinko's Copies.

Your grade in the course will be based on one quiz on probability and statistics (10%), one midterm exam (30%), a final exam (30%), and an individual applied regression project (30%). Problems and computing assignments will be given frequently, and completion of these is essential to learning econometrics and, incidentally, doing well on the exams and the project. I will not grade your problem sets, but we will go over these in class and/or during my office hours. I will ask you to turn in some computer assignments, to make sure you are keeping up with that part of the course.

**Individual Regression Projects**

The applied regression project will hopefully be an interesting and worthwhile experience for each of you. You are free to choose any topic in empirical economics that is amenable to econometric analysis. Ideas for topics may be found in *The Review of Economics and Statistics, Applied Economics*, and other applied...
economics journals. You may also get some ideas from other economics courses, and from examples presented in the text and in lectures. The optional text by Berndt is also full of ideas, references, and data.

Although the topic choice is fairly open-ended, I do want to make sure that everyone finds an appropriate topic and does so long before the end-of-term rush. You are therefore required to submit a brief written proposal identifying the topic you will investigate, sketching a tentative model for estimation, providing some theoretical basis for your model, describing hypotheses to be tested and questions to be addressed, and identifying the data sources and some background literature relevant to your project. This can be done in three or four pages. The more preliminary information you can provide me in your proposal, the better I can guide you in your project. This proposal is due on March 12. You are invited to discuss your ideas with me at any time during the development of your project.

Once we have agreed on a project you should collect the necessary data and proceed with the estimation. In estimating your model there may be several variants you will try (alternative functional forms, differing variable definitions, alternative lag structures, etc.). You will also certainly encounter various econometric problems. An important part of your assignment is to test for the presence of econometric problems (autocorrelation, heteroscedasticity, multicollinearity, etc.) and to deal with these problems using procedures you will learn in the course. The evaluation of your project will reflect, in part, your skill in handling these econometric problems, and your use and interpretation of variants of your basic model. Which variations, for example, are most convincing in terms of consistency with the underlying theory and absence of econometric problems?

When you have completed your estimation, you should prepare your final report following the format of empirical articles in economics journals. Typically these papers include the following:

1. Introductory overview of the research question; statement of objectives.
2. Presentation of theory and review of relevant theoretical literature.
3. Discussion of previous empirical work in the area; critique and explanation of why your work is vastly superior, or at least different.
4. Specification of your model(s) to be estimated; variable definitions and description of data sources.
5. Presentation of results: estimated equations and summary statistics; results of tests of econometric problems and description of corrective actions taken; results of statistical tests of hypotheses; comparison with other studies.
6. Conclusion; implications of your results for theory and policy; suggestions for further research (now that I have done all this work, this is how I would do it right).
Your final paper is due on the last day of our class, April 30. Include with your written paper the computer printouts of your most important results. Late papers will be penalized by 10 percentage points if I receive it before I must post grades, and by 20 percentage points if it is any later.

Important Dates:

- February 4 - Statistics Quiz
- March 12 - Proposals Due
- March 19 - Midterm Exam
- April 30 - Projects Due
- May 12 (11:30) - Final Exam

Readings and Assignments


Computer exercises refer to the TSP Laboratory Manual, 1992 revision, by McNown and Hunt, available at Kinko's Copies. Exercise numbers in parentheses are not required, but I recommend that you read the relevant sections in the manual to become aware of the TSP commands and procedures introduced there.

I. Probability and Statistics. The prerequisites for this course include the essentials of probability and statistics, as presented in Chapters 1-6 of Kmenta. Since this is assumed background, little of this material will be presented in class, but you will be responsible for reviewing this material largely on your own. Lectures will supplement the material in Kmenta, presenting multivariate extensions of some concepts and emphasizing topics of particular importance. The following outline offers some suggestions for your review. You will be given a quiz covering this material on February 4.

Guidelines for Probability and Statistics Review:

- Chapter 1. Know the essential concepts (random variables, probability distributions, etc.) presented here.
- Chapter 2. Not important.
- Chapter 3. Some essential concepts are presented in Sections 1 and 3. Do not get too bogged down with permutations and combinations in Section 2. Sections 5-7 are vital. Exercises covering this material are included with the material at Kinkos.
- Chapter 4. Concentrate on the normal distribution, not the binomial distribution. Work problems 4.6, 4.7, 4.8.
- Chapter 5. Essentials of hypothesis testing and distributions related to the normal - should be familiar material.
II. Classical Regression; Multicollinearity; Specification Error. 
Kmenta, Chapters 7, 10 
TSP Lab Exercises I, II, (III).

III. Problems of Regression: Autocorrelation; Heteroscedasticity; Multicollinearity; Specification Error. 
Kmenta, Chapters 8, 12 (sections 1,2). 
TSP Lab Exercises VI, (VII), VIII.

Midterm Examination: March 19

IV. Extensions of the Basic Regression Model: Dummy Variables, Distributed Lag Models, Limited Dependent Variable Models. 
Kmenta, Chapter 11 (sections 1,4,5,6) 
TSP Lab Exercises (IV), V.

V. Seemingly Unrelated Regressions and Simultaneous Equations 
Kmenta, Chapter 12 (section 3), Chapter 13. 
TSP Lab Exercise IX.

Final Examination: Tuesday May 12, 11:30 - 2:30.