

**EC 760 Econometrics I
Part I: Statistics Inference
Spring, 1999**

Professor Jushan Bai
Tuesday-Thursday 9:00-10:30am, Carney 9
Office Hours: Tuesday 10:30am-12:30 pm and by appointment
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Course Objectives

This course is a continuation of Probability Theory (econ 730) offered in the Fall of 1998. It covers topics in statistical theory and methodology that are useful for further study of econometrics. Prior training in statistics is not necessary, but familiarity with basic algebra, calculus, and probability theory is assumed.

Required Text

DeGroot, M.H.: *Probability and Statistics*, Addison-Wesley, 1986.

The book is available in the Bookstore.

Alternative Textbooks

The material covered in the course can be found in a number of textbooks. Two of them are listed below:

Introduction to Probability Theory and Statistical Inference, by Harold, J. Larson, 1982.

An Introduction to Mathematical Statistics and its Applications, by Richard Larsen and Morris Marx, 1986.

Requirements and Grading

There will be weekly assignments. Late assignments will not be accepted as written answers will be passed out. It is essential to attempt all problems by yourself, even though you are allowed to work together on the assignments.

There will be one mid-term and one final. The mid-term exam will be given in class, Tuesday, March 9, and the final exam will be held in the final exam week.

The course grade will be determined by the assignments (15%), the mid-term exam (35%), and the final (50%).

Course Outline

Estimation

Statistic(s), estimators, unbiasedness, consistency, likelihood function, maximum likelihood estimation, sufficient statistics, factorization theorem, Fisher information, Cramer-Rao lower bound, efficiency, delta method, method of moments, Bayesian estimation.

DeGroot, Chapter 6, sections 7.7-7.8

Larson, Chapters 6 and 7 (section 7.1-7.2).

Larsen and Marx, Chapter 5

Sampling Distribution of Estimators

Chi-Square distribution, joint distribution of sample mean and sample variance, t-distribution, F-distribution, confidence intervals.

DeGroot, Chapter 7

Larsen and Marx Chapter 7

Hypothesis testing

Type I and type II errors, size, power, likelihood ratio test statistics (LRT), generalized LRT, one-sample problem, two-sample problem, t-test, chi-square test, and F-test.

DeGroot, Chapter 8

Larson, Chapter 8

Larsen and Marx, Chapters 6 and 8.

Large Sample Hypothesis Testing

Wald, Lagrange Multiplier (LM) and Likelihood Ratio (LR) tests.
Lecture notes.