

Course Syllabus

**Eco 6372
Econometrics I
Fall 2011**

**Prof. Tom Fomby
MW 2:00 – 3:20 PM
303 Lee**

Purpose of Course:

This course is dedicated to developing tools in mathematical statistics that are especially useful in subsequent econometrics courses in the Ph.D. program.

Student Learning Objectives:

The student will learn the essentials of and demonstrate proficiency in

- **probability theory**
- **estimation theory**
- **hypothesis testing**
- **maximum likelihood methods**
- **efficiency in estimation**
- **most powerful tests**
- **Bayesian inference**
- **bootstrapping methods**

Evaluation of Student:

The student will be evaluated on the basis of (1) two mid-term exams, (2) homework assignments, and (3) a final exam. The course average will be computed using a 20% weight on each of the mid-term exams, a 20% weight on the homework assignments, and 40% weight on the final exam.

Recommended Textbook:

Mathematical Statistics for Economics and Business by Ron C. Mittelhammer (Springer, 1996) hereafter referred to as **Mittelhammer**.

Office: Room 301M, Umphrey Lee, 214-768-2559

Office Hours: Monday and Wednesday 3:30 – 5:00 PM or by appointment

E-mail: tfomby@smu.edu

Class Website: <http://faculty.smu.edu/tfomby>

My Graduate Teaching Assistant: Jing Li. E-mail address: lj@smu.edu

Important Dates to Remember:

First Day of Class: August 22

Labor Day Holiday: September 5

Fall Break: Monday and Tuesday, October 10 and 11

Last Day to Drop Classes: Friday, November 4

“No Class” Day: Wednesday, November 23

Thanksgiving Holiday: Thursday and Friday, November 24 and 25

Last Day of Classes: Monday, December 5

Final Exam Date: Wednesday, December 14, 8:00 – 11:00 AM in Room 303 Lee.

Excused Absences for University Extracurricular Activities:

Excused Absences for University Extracurricular Activities: Students participating in an officially sanctioned, scheduled University extracurricular activity should be given the opportunity to make up class assignments or other graded assignments missed as a result of their participation. It is the responsibility of the student to make arrangements with the instructor prior to any missed scheduled examination or other missed assignment for making up the work. (University Undergraduate Catalogue)

Disability Accommodations:

Disability Accommodations: Students needing academic accommodations for a disability must first contact Disability Accommodations & Success Strategies (DASS) at 214-768-1470 or www.smu.edu/alec/dass.asp to verify the disability and to establish eligibility for accommodations. They should then schedule an appointment with the professor to make appropriate arrangements. (See University Policy No. 2.4)

Religious Observance:

Religious Observance: Religiously observant students wishing to be absent on holidays that require missing class should notify their professors in writing at the beginning of the semester, and should discuss with them, in advance, acceptable ways of making up any work missed because of the absence. (See University Policy No. 1.9.)

Honor Code:

All SMU students are bound by the Honor Code (see SMU Student Handbook for a complete discussion of the SMU Honor Code). The code states that “any giving or receiving of aid on academic work submitted for evaluation, without the express consent of the instructor, or the toleration of such action shall constitute a breach of the Honor

Code.” A violation can result in an “F” for the course and an Honor Code Violation on your transcript.

TOPICS

I. Brief Introduction to Probability Theory

- A. Basic Axioms of Probability Theory
- B. Some Univariate Discrete Distributions
 - i. Bernoulli
 - ii. Binomial
 - iii. Poisson
 - iv. Negative Binomial
- C. Some Univariate Continuous Distributions
 - i. Uniform
 - ii. Exponential
 - iii. Normal
 - iv. Gamma
 - v. Beta
 - vi. Multinomial
- D. The Exponential Class of Densities
- E. The Multivariate Normal Distribution

Reference: Chapter 4 in **Mittelhammer**

Exercises to be assigned

II. The Idea of Copulas

- A. Sklar’s Theorem
- B. Various Copulas
- C. Estimation

Reference: Handouts in Class

Exercises to be assigned

Mid-term # 1

III. Estimation Theory - I

- A. The Method of Maximum Likelihood and its Properties
- B. Hypothesis Testing in Maximum Likelihood
- C. Methods of Estimation
- D. Quasi-Maximum Likelihood Estimation and Inference

Reference: Chapter 8 in **Mittelhammer** and Handouts in Class

Exercises to be assigned

IV. Estimation Theory - II

- A. Efficiency of Estimation - MVU
- B. Cramer-Rao Approach
- C. Minimal Sufficient Statistics Approach

Reference: Chapter 7 in **Mittelhammer**

Exercises to be assigned

Mid-term # 2

V. Hypothesis Testing Theory

- A. Size and Power of Tests
- B. Laws of Large Numbers
- C. Central Limit Theorems
- D. Asymptotic Distributions of Random Variables

Reference: Chapter 9 in **Mittelhammer**

Exercises to be assigned

VI. Bayesian Inference

- A. Bayes Theorem
- B. Bayesian Estimation and Hypothesis Testing – Some Examples
- C. Empirical Methods for Determining Posterior Distribution

References: Handouts in Class

Exercises to be assigned

VII. Bootstrapping Methods

- A. I.I.D. Case
- B. N.I.I.D. Case

Reference: Handouts in Class

Exercises to be assigned

Final Exam

End of Course