**ECON 9710: Econometrics I - Statistical Foundations**
Fall 2012, CRN: 86234
TR 11:00 – 12:15 P.M.; Sparks Hall 324

**Professor:** Rusty Tchernis  
**Office:** Department of Economics, AYSPS Building #533  
**Phone:** (404) 413-0154  
**E-mail:** rtchernis@gsu.edu  
**Office Hours:** Tuesday, Thursday 1:30 – 2:30 PM, or by appointment.

**Course Objectives:** This course provides probability and statistical tools necessary for studying econometrics at the Ph.D. level. Topics covered include basic techniques of probability theory, estimation, hypothesis testing, and estimation methods. Applications of these concepts to economic problems and illustrations from economics are emphasized.

**Prerequisites:** Basic probability and statistical inference, multivariate calculus (differential and integral calculus involving two or more variables), and linear algebra. The course is limited to Economics Ph.D. students or permission of instructor.

**Required Textbooks:**  

**Recommended Textbook:**  

**Computer Program:** I will use MATLAB to present how to apply the theoretic concepts we will cover in this course. I will provide some help and tutorials, but students are encouraged to experiment with software.

**Requirements and Grading Policy:** There will be a series of seven problem sets given during the semester. The problems and due dates will be posted on the Web. No late homework will be accepted. Grades will be based on Exam I (20%), Exam II (20%), a final exam (35%) and problem sets (25%). The Plus (+) and Minus (-) grading system will be used in assigning the overall letter grade for the course.

The first in class exam is scheduled for **Thursday, September 20**; the schedule for the second exam is **2 Thursday, November 1**. The schedule for both class exams is preliminary and might change. The final exam will be given on the date and time listed on the Registrar’s schedule: **Thursday, December 6, 10:45 – 13:15** in Sparks Hall 324. Please make sure that you have no conflicts with the exam schedules. There will be no make-up exams. All exams must be done independently; no collaboration is allowed in any of the exams.

**Econ 9710 Class Homepage:** We will be using uLearn system. The homepage will be used primarily to post assignments and announcements. Please DO NOT use the uLearn email system for communications, but email me directly at rtchernis@gsu.edu.
Further Requirements and Policies: You are expected to attend classes regularly. Please refer to the GSU Policy on Academic Honesty (Section 1350 in the Graduate Catalog, page 59.) [http://www.gsu.edu/images/Downloadables/Catalog_Graduate_09-10.pdf](http://www.gsu.edu/images/Downloadables/Catalog_Graduate_09-10.pdf).

This course syllabus provides a general plan for the course; deviations may be necessary.

Course Outline and Reading List
[CB refers to the text by Casella and Berger (2002)]

Part I: Probability and Random Variables
1. Basic concepts of probability and statistics (CB 1.1-1.3)
   1.1 Probability set function
   1.2 Conditional probability and independence
2. Random variables, distributions and densities (CB 1.3 - 1.6, 2.1)
3. Expectations, moment generating functions and inequalities (CB 2.2 - 2.4, 3.6)

Part II: Distributions
4. Univariate distributions (CB 3.1 - 3.3, 3.6)
   4.1 Binomial and related distributions, Poisson and Negative binomial distributions,
   Gamma and Chi-square distributions, Normal distribution, Lognormal distribution
   4.2 Beta, t and F distributions
5. Multivariate distributions (CB 4.1 - 4.2, 4.5 – 4.6)
   5.1 Joint, marginal and conditional distributions
   5.2 Independent random variables
   5.3 Expectations, Variance-covariance and correlation
   5.4 Multivariate normal distribution, Multinomial distribution
6. Transformations and mixtures (CB 4.3 -4.4)

Part III: Statistical Inference
7. Sampling Theory (CB 5.1 – 5.3, 5.5)
   7.1 Sampling distributions
   7.2 Introduction to asymptotic theory
   7.3 Concepts of convergence
   7.4 Laws of large numbers
   7.5 Central limit theorems
8. Estimation
   8.1 The basics (CB 6.1 - 6.3, 7.1- 7.3, 9.1, 9.2.1, 10.1)
   8.1.1 Point and interval estimation
   8.1.2 Properties and methods of evaluating estimators
   8.2 Maximum likelihood estimation (CB 7.2.2)
   8.3 Method of moments estimation (CB 7.2.1)
   8.4 The linear regression model (CB 11.3)
9. Hypothesis Testing (CB 8.1 – 8.3, 10.3)
   9.1 Null and alternative hypotheses
   9.2 Type I and type II errors
   9.3 Maximum likelihood tests
   9.4 Theory of statistical tests