ECON 900
Econometrics I
Mathematical Statistics for Econometrics

P.W. Wilson Fall 2009

Class location and time: 214 Sirrine Hall, Tue. and Thu., 2:00pm–3:15pm
Office: 201E Sirrine Hall
Office hours: 4:00–5:00am Tue. and Thu., or by appointment
Email: pww@clemson.edu
WWW: http://www.clemson.edu/economics/faculty/wilson

Required texts:

- G. Casella, R.L. Berger (2002), *Statistical Inference,* 2nd edition, Pacific Grove, CA: The Wadsworth Group, Inc.
- P.E. Pfeiffer (1978), *Concepts of Probability Theory,* 2nd edition, New York: Dover Publications, Inc.

Other texts that might be useful:

- C.R. Heathcote (1971), *Probability: Elements of the Mathematical Theory,* New York: Dover Publications, Inc.
- R.V. Hogg, J.W. McKean, A.T. Craig (2005), *Introduction to Mathematical Statistics,* 6th edition, Upper Saddle River, NJ: Pearson Education, Inc.
- A. Zaman (1996), *Statistical Foundations for Econometric Techniques,* San Diego: Academic Press, Inc.

Additional Course Materials:

You can find additional course materials by going to my home page (see above), clicking on the link entitled "course materials for students," and following the obvious links.

Course Objectives:

This course is the first in a sequence of graduate econometrics courses required for Ph.D. students in economics. The course is intended to provide intellectual tools that will be essential for successful completion of Econometrics II and Econometrics III (i.e., ECON 807 and ECON 808). Some of these tools may also be useful for microeconomic theory.

Economists often look at data to test implications of theoretical economic models or otherwise learn about agents' response to varied incentives or other economic behavior. Note, however, that it is not possible to learn "truth" from data; typically, the best that one can hope for is to make a probabilistic statement about the phenomenon of interest after examining data. Statistical and econometric theory are essential for quantifying what can be learned from data. Consequently, this course deals with theory necessary for applied,

empirical work. One should not attempt empirical research without a solid understanding of theory necessary to quantify what might be learned from data.

Exams will be designed, as far as possible, to assess students' higher-order thinking, as opposed to low-level knowledge (regurgitation, description) and comprehension (rephrasing of memorized facts). Higher-order thinking in the context of this course is associated with the ability to implement and use methods for statistical estimation and inference; to synthesize concepts in order to design approaches for estimation and inference; to analyze and compare different approaches for estimation and inference; and to analyze data and draw reasonable conclusions supported by the data.

It is not possible to cover in a single-semester course all the tools that will be useful for a career as an economist. Some additional tools will be developed in Econometrics II and III, but even then additional learning will be required. This course, as well as those that follow, should give students sufficient background to be able to read, understand, and assimilate material from journal articles and advanced textbooks. The topics covered in this course provide a foundation consisting of the most essential, fundamental concepts that are necessary for further learning.

Requirements:

Students are expected to have a working knowledge of calculus and matrix algebra. In addition, students should possess basic computer skills, and the ability to read and understand software documentation.

I will make reading assignments in class. Students should review material from the previous class as well as any reading assignments before each class.

Class attendance is not mandatory in the sense that I will not check the class roster in each class. However, it is not possible to pass this class (or any other worthwhile graduate-level class) without attending and actively engaging in the intellectual exercises that take place in class.

Course Grade Determination:

Students will have the following opportunities to demonstrate their abilities: homework assignments (10%), midterm exam (30%), and a final exam (60%). I expect the homework assignments to be done individually; however, I encourage you to consult with each other in working the homework assignments, although copying someone else's work is not permitted—I am encouraging only a mutual exchange of ideas. The homework assignments will include problems as well as empirical exercises, and will serve to reinforce material discussed in class.

The relative weightings shown above are approximate. In particular, homework assignments are manditory, as is class attendance. Shirking will result in (perhaps severely) reduced grades.

Grades on homework or exams may be challenged by submitting a written (i.e., typed), well-reasoned argument within 24 hours after the homework or exam is returned to students in class. I am happy to discuss course material, concepts, etc. at any time, but will consider changes to assigned grades only within the framework described here.

Please note that homework submitted late will receive a grade of zero. All students must take the midterm and final exams. In the event of a serious medical problem, other arrangements will be made after sufficient evidence of a serious medical problem is provided. To avoid possibly unpleasant outcomes, students are advised to make such arrangements before missing an exam.

Office Hours:

My office hours are shown above. If you need to see me at other times, I will be happy to meet with you; a good approach is to ask me about an appointment after class. I will be happy to meet with you.

You may also visit my Teaching Assistant, who will be able to answer many of your questions. I will provide details early in the semester.

Topics:

1. Probability and Measure
2. Borel Measurability, Integration, and Mathematical Expectations
3. Conditional Expectations
4. Distributions and Transformations
5. Multivariate Normal Distribution and Inference
6. Modes of Convergence
7. Central Limit Theorems
8. Robustness

Other topics may be covered as time permits. I reserve the right to revise the above list as the course progresses, but will make relevant announcements in class.