

## **ECON 3120: APPLIED ECONOMETRICS**

SPRING 2016

Department of Economics, Cornell University

TR 1:25-2:40 p.m. – Malott Hall 228 (Bache Auditorium)

**(Note: There will be no class on February 18.)**

Instructor: Prof. Claire (Seon Hye) Lim  
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Office Hours: Mondays 3:30-4:30 p.m.

Teaching Assistant 1: Xingtong Zhang  
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Teaching Assistant 2: Yu (Leo) She  
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### **Course Description**

Econ 3120 is the second course in the applied statistics-econometrics sequence. The main objective of this course is to teach students to use and interpret a set of quantitative methods frequently employed in empirical analysis of economic phenomena. *Applications* will be emphasized throughout the course, but it is also an objective of this course to provide sufficient grounding in the underlying theory to enable students to understand the conceptual framework and to link these methods with more advanced ones that may be studied later.

The first part of the course will review key concepts in statistics to prepare students for learning regressions analyses. It will include sampling processes, structure of the data, random variables, probability distributions, and hypothesis testing. The first part of the course will end with a thorough discussion of the simple linear regression model. Knowledge of the linear regression model and its extensions is essential for doing empirical work in, economics, business, and other social sciences. As we work through this model, we will focus on how to use regression to identify causal impacts of one variable on another.

In the second part of the course, we will discuss how to analyze relationships among several economic variables. In the third part, we will study advanced topics such as panel data models, simultaneous equation models, and limited dependent variable models.

Throughout the course, students will utilize the Stata statistical package to implement many of the procedures introduced in class.

### **Prerequisites**

Prerequisites are Econ 1110-1120, Math 1110, and ECON 3110 or 3130. It is assumed that students have a basic knowledge of algebra, including differentiation and integration; both these tools will be used during the course.

### **Exams and Grade Policy**

Grades in this course will be based on the following:

1. 5-6 problem sets, which will include empirical exercises, counting towards 25% of the final grade. Problem sets will be due in section or class and the due dates are firm. Late problem sets will not be accepted. Computer exercises must include the Stata .do and .log files that you produce.
2. Test 1, Test 2, and a final exam, each counting towards 25% of the final grade. Exams are NOT cumulative. Two of these tests will be given in class:

**Test 1: Tuesday, March 8**

**Test 2: Tuesday, April 14**

The final test will be given during the final exam period. **No makeup exams will be offered.** Finally, class participation is not explicitly graded, but you are strongly encouraged to ask questions during class.

### **Sections**

There are four sections for the course. These meet on Fridays in Baker Laboratory 135, and will be held by the TAs. The sections are used to go over problem sets and supplementary review materials and to answer questions.

## **Statistical Software**

In order to become skilled in applied econometrics, you need to be doing it in practice. Hence, most problem sets will contain computer exercises. For this class we will be using the Stata statistical software package. You can use Stata for free by setting up an account with CISER ([www.ciser.cornell.edu](http://www.ciser.cornell.edu)). Stata is also available in the public computer labs in Warren Hall and Mann Library. If you want to install Stata on your laptop, you can purchase a license through Stata Campus Pickup GradPlan at the following link:

<http://www.stata.com/order/new/edu/gradplans/gp-campus.html>

## **Textbook**

There is a required textbook for this course: *Introductory Econometrics*, 6th Edition, by Jeffrey Wooldridge. Although the 6<sup>th</sup> edition is officially adopted, using 5<sup>th</sup> edition is allowed and is expected to cause little inconvenience. The two editions have the same structure of contents. There will be several copies of the textbook in the Uris Library course reserve.

The first 2-3 weeks of this course will deviate from the textbook. Therefore, it is very important to attend the class.

## **Blackboard**

Class announcements will be sent through Blackboard, and course materials will be posted there. Handouts will often be posted on the Blackboard site as a supplement to the lectures. There will be important material covered in the lecture that does not appear on the handouts. Thus, reading the handouts should not be viewed as a substitute for coming to class.

## Course Outline

### Part I. Review of and Introduction to Key Concepts in Econometrics

1. What is Econometrics? Motivation and Background (Chapter 1)
2. Structure of Data (Chapter 1), Sampling, Random Variables and Probability Distributions (Appendix B)
3. Normal Distribution (Appendix B-5)
4. Key Concepts in Statistical Inference (Appendix C)
  - (a) Unbiasedness and Variance of an Estimator
  - (b) Law of Large Number
  - (c) Central Limit Theorem
  - (d) Hypothesis Testing
5. Simple (Two-variable) Linear Regression Model (Chapter 2)
  - (a) Motivation and Definitions
  - (b) Ordinary Least Squares (OLS) estimation
  - (c) Correlation coefficient and  $R^2$
  - (d) Sampling Properties of OLS estimates

### Part II. Multiple Regression Models

1. Multiple Regression Model (Chapter 3)
  - (a) Motivation and Interpretation (Section 3.1)
  - (b) OLS estimation and mechanics (Section 3.2)
  - (c) Sampling Properties of the OLS estimator and estimation of error variance (Section 3.3 and 3.4 and Section 5.1)
  - (d) Significance of coefficients, asymptotic normality and t-tests (Sections 4.2 and 5.2)
  - (e) Testing linear hypotheses, F-tests (Sections 4.4 and 4.5)
2. Use of Dummy Variables (Chapter 7)
3. Instrumental Variable (IV) Estimation (Chapter 15)

### Part III. Advanced Topics

1. Panel Data Models (Chapters 13-14)
2. Simultaneous Equation Models (Chapter 16)
3. Limited Dependent Variable Models (Chapter 17)