**APPLIED ECONOMETRICS (ECO 683)**

Shiv Nadar University: Department of Economics

Monsoon Semester, 2015

Instructor: Gitanjali Sen

Class Meeting on Thursday: 10 am to 1pm.

**COURSE OBJECTIVE**

Applied Econometrics aims to equip students with empirical techniques that are extensions of the Classical Linear Regression Framework. These techniques become useful in addressing many issues that arise in carrying out applied empirical research. The first part of this course will focus on developing theoretical models that can handle limited dependent variables, count data, and duration data. The second part of the course will focus on models that are useful in handling interpretative issues of sample selection bias, endogeneity, and causality. The course will emphasize hands-on-sessions so that students are able to apply these models in practical situations.

**REQUIRED TEXTS**

1. G.S. Maddala: Limited Dependent and Qualitative Variables in Econometrics, Cambridge University Press, Cambridge.
2. William H. Greene: Econometric Analysis, Prentice Hall, New Jersey.
3. A. Colin Cameron and Pravin K. Trivedi: Microeconometrics, Cambridge University Press, Cambridge.
4. A. Colin Cameron and Pravin K. Trivedi: Microeconometrics Using Stata, Cambridge University Press, 2010.
5. Joshua D Angrist, Jorn-ste_en Pischke: Mostly Harmless Econometrics, Princeton University Press, 2009.
6. Recommended Texts and selected journal articles will be suggested as and when particular topics are discussed.

**GRADING**

Grading for the course will be based on class participation, one midterm, a computer project, and a final examination. Distribution of the course grade is as follows.

- Class participation: 10%
- Midterm: 30%

- Project: 30%
- Final: 30%

There will be NO RETAKE of any exam. The Final exam would be cumulative, i.e., it will cover the entire course material. The project should reflect your original work, and anyone found guilty of plagiarism will get a fail grade. You should strictly follow the deadline while submitting the project. In case you find any difficulty in completing on time, please discuss with me before the deadline.

**COURSE OUTLINE**

1. Limited Dependent Variable Models
    - 1.1 Censored model
        - 1.1.1 Specification: Left and right censored models
        - 1.1.2 Estimation
        - 1.1.3 Inference and testing
        - 1.1.4 Prediction
    - 1.2 Truncated model
        - 1.2.1 Specification: Left and right censored models
        - 1.2.2 Estimation
        - 1.2.3 Inference and testing
        - 1.2.4 Prediction
    - 1.3 Mixture models
    - 1.4 Models of friction
2. Count Data Models
    - 2.1 Specification and interpretation
    - 2.2 Maximum Likelihood Estimation
        - 2.2.1 The Poisson distribution
        - 2.4.2 The Negative Binomial distribution
    - 2.3 The problem of over dispersion
    - 2.4 Modeling tick movement in bond markets
3. Duration (Hazard) Models
    - 3.1 Introduction and idea development
    - 3.2 Alternative distributions for characterization of hazard models
    - 3.3 Estimation of hazard models

3.3.1 Non-parametric estimation

3.3.2 Parametric estimation: no exogenous variables in hazard function

3.3.3 Parametric estimation: exogenous variables in hazard function

3.4 Incorporating heterogeneity in hazard models

3.5 Diagnostic checking

4. Selection Models

4.1 Introduction and specification

4.2 Conditional versus unconditional inference

4.3 Estimation

4.3.1 Two-step estimation of Heckman's selection model

4.3.2 Maximum likelihood estimation of Heckman's selection model

5. Endogeneity and Causality

5.1 Concept of endogeneity

5.2 How endogeneity can arise in practice

5.3 Handling endogeneity bias

5.4 Concepts of causality

5.5 Making causal inference

5.5.1 Regression discontinuity

5.5.2 Randomized control trials (RCT)

6. Computer Project

Students are required to write a short but comprehensive empirical paper on a topic of their choice, but utilizing the techniques mastered in the course. The project must also address data issues and other methodological problems that arise in empirical applications. Use of SAS/STATA for executing the empirical project is strongly encouraged. Guidelines will be provided for possible topics as well as methodology for empirical research.

**OFFICE HOURS**

Tuesday: 10 am to 12:00 noon, else by appointment.