Course title: Econometrics-II				
Course code: MPE 187	**No. of credits:** 4		**L-T-P:** 46–0–28	**Learning hours:** 60
Pre-requisite course code and title (if any): None				
Department: Department of Policy and Management Studies				
Course coordinator: Dr Priyanka Arora		**Course instructor:** Dr. Priyanka Arora		
Contact details: Priyanka.arora@terisas.ac.in				
Course type: Core		**Course offered in:** Semester 2		

Course description:

This course builds on the basic understanding of causal inference using classical linear regression modelling using cross-sectional data. The course begins with developing an understanding of asymptotic analysis and deriving the asymptotic properties of an estimator, using the Ordinary Least Square Estimator as an example. Causal inference using multiple linear regression analysis is extended to models with qualitative information. Linear Probability Model thus serves both the purpose of an illustrative example of relinquishing the linearity assumption and motivating non-linearities in parameters. Understanding of non-linearities is put into practice for the data-generating process that involves censoring and truncation. In the last but important module, the understanding of omitted variable bias due to the underlying endogeneity is used to motivate linear panels and learn estimation and inference using Panel data models.

The students learn data analysis using both cross-sectional data and panel data using software such as STATA.

Course objectives:

1. To provide an understanding of the restrictive assumptions of the classical linear regression model and examples of violation and correction for causal inference.
2. To understand the problems of censoring and truncation in modelling the data generating process and remedial measures.
3. To understand and model panel data for causal inference.
4. To provide hands-on training in the use of statistical software for data analysis.

Course contents				
Module	**Topic**	**L**	**T**	**P**
1	**Multiple Regression Analysis**: OLS Asymptotic Asymptotic Properties of OLS: Consistency, Efficiency, and Asymptotic Normality	4	0	0
2	**Multiple Regression Analysis: Further Issues:** Effects of Data Scaling on OLS Statistics Models with Logs and Quadratics Models with Interaction Terms	2	0	4
3	**Multiple Regression Analysis with qualitative Information** Single/ Multiple Dummy Independent Variables/Ordinal Information using Dummy Variables A Binary Dependent Variable: Latent Variable approach, Linear Probability Model, Logit and Probit Model. Interpretation of Marginal Effects. Multinomial Choice Model/Conditional Choice Model. Interpretation of odds and log-odds ratio.	8	0	5
4	**Generalized Least Square methods (GLS)** Testing for Homoskedasticity- White's test, Breusch Pagan Test White's Robust Standard Errors Homoskedasticity Correction using GLS Bootstrap Standard Errors	6	0	2

5	**Instrumental Variables and Two Stage Least Square methods** Measurement Error Testing for endogeneity Statistical Inference with the IV Estimator Two Stage Least Squares	10	0	5
6	**Sample Selection Correction** Tobit-Type I Model for corner Solution Tobit-Type II Model for Sample Selection Truncated Regression Models	8	0	6
7	**Simple Panel Data Methods** Fixed Effect Estimator (Time demean transformation, first differencing transformation, dummy variable approach) Difference in Difference estimator	8	0	6
	Total	**46**	**0**	**28**

Evaluation criteria:
1. **Minor 1 Exam-** (Modules 1, 2) – 30%
2. **Minor 2 Exam-** (Modules 3, 4, 5) – 30%
3. **Major Exam-** (Modules 6,7) – 40%

Learning outcomes:
At the end of this course, students will be able to
1. Understand the violations of classical linear regression model assumptions and measures of correction. (Evaluation criteria 1)
2. Understand the problem of censoring and truncation in sampling methods ((Evaluation criteria 2).
3. Apply Linear Panel Models for causal inference using Panel Data (Evaluation criteria 2).
4. Apply statistical and econometric concepts to economic models (All evaluation criteria)
5. Use STATA and reporting and interpreting software outputs (All evaluation criteria)

Study Materials:
1. *Wooldridge, J.M. 2007. *Introductory Econometrics: A Modern Approach*, 7th Edition, Boston: Cengage
2. Greene, W. H. 2003. *Econometric Analysis*, 5th edition, New Jersey: Prentice Hall.
3. Baum, C. 2006. *An Introduction to Modern Econometrics Using STATA*, Stata Press
* Indicates core reference

Pedagogical Approach:
– Classroom teaching, problem solving, assignments and quizzes
– Hands-on introduction to software applications

Additional information: Students must have basic understanding of Statistics and Econometrics.

Student responsibilities: Attendance, feedback, discipline: as per university rules.

Prepared by: Kavita Sardana

Reviewers
1. Prof. JV Meenakshi, Professor, Delhi School of Economics.
2. Prof. Abhiroop Mukhopadhyay, Professor, ISI Delhi.