Course title: Advanced Econometrics

Course code: MPE 124	**No. of credits:** 4	**L-T-P:** 42-7-22	**Learning hours:** 60

Pre-requisite course code and title (if any): MPE 172 or equivalent

Department: Department of Policy Studies

Course coordinator: Dr Kavita Sardana	**Course instructor:** Dr Kavita Sardana

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Course type: Elective	**Course offered in:** Semester 3

Course description:

This is an advanced level course in the area of Applied Econometrics dealing with Panel Data and Nonlinear Models. The range of topics covered in the course will span a large part of econometrics generally, though we are particularly interested in those techniques as they are adapted to the analysis of panel or longitudinal data sets. The asymptotic distribution theory necessary for analysis of generalized linear and nonlinear models will be reviewed or developed as we proceed. The second half of the course will focus on nonlinear models. Topics covered will focus on micro-econometric methods, including binary and discrete choice modelling, limited dependent variables, and sample selection. Special emphasis is given to estimation methods including maximum likelihood and generalized methods of moments.

Lab Practicals

This course places heavy emphasis on solving computer exercises. Practicals will involve applications from the fields of labor economics, environmental economics, and agricultural economics.

Course objectives:

1. To understand basic differences in linear endogenous variables and non-linear endogenousvariables
2. Learn about violations of classical linear model assumptions (relating to first and second moments) under panel and non-linear regression.
3. Learning solutions through theoretical and empirical analysis

Course contents

Module	Topic	L	T	P
1	**Linear Models: Panel Data Models Basic Linear Unobserved Effects Panel Data Models** Estimating Unobserved Effects by Pooled OLS Random Effects Methods Fixed Effects Methods First Differencing Methods Comparisons of Estimators **Unobserved Effects Models without the Strict Exogeneity Assumption** Models with Individual-Specific Slopes GMM approaches to Linear Unobserved Effects Models	14	3	7
2	**Nonlinear Models** **Geometry of Non-linear Modelling** Intrinsic Nonlinearity Parameter Effects Nonlinearity Linear Approximations Nonlinear Least Squares Gauss Newton algorithm **Discrete Response Models** Index Models for Binary Response: Probit and Logit Multinomial Response Models Ordered Response Models **Cornered Solution Outcomes and Censored Regression Models** Estimation and Inference with Censored Tobit Sample Selection, Attrition, and Stratified Sampling. Selection on the basis of the Response Variable: Truncated Regression A Probit Selection Equation A Tobit Selection Equation Stratified Sampling **Count Data and related Models**	28	4	15

	Poisson Regression Models Negative Binomial Regression Models and log-normal Poisson Models			
	Total	**42**	**7**	**22**

Materials:

Textbooks

Module 1 and Module 2

1. (**Core**) J.M. Wooldridge, Econometrics Analysis of Cross Section and Panel Data. The MIT Press, Cambridge, Massachusetts. 2002.

Module 2

2. (**Core**) Bates, Douglas M., and Donald G. Watts. "Nonlinear regression: iterative estimation and linear approximations." Nonlinear regression analysis and its applications (1988): 32-66.

Other readings

Module 1

1. Baltagi, B.H., Econometric Analysis of Panel Data. New York: John Wiley. 1995.2.
2. Module 2: Hsiao, C., Analysis of Panel Data. Cambridge: Cambridge University Press. 1986.
3. Chamberlain, G., "Multivariate Regression Models for Panel Data," Journal of Econometrics 18 (1982), pp. 5-46.
4. Cornwell, C., and D Trumball, "Estimating the Economic Model of Crime with Panel Data," Review of Economics and Statistics 76 (1994), pp. 360-366.

Module 2

1. William H. Greene, Econometric Analysis. New York: MacMillan. 1997.
2. Cameron, A.C., and P.K. Trivedi, Microeconometrics: Methods and Applications. Cambridge University Press, New York. 2005.
3. Maddala, G.S., Limited Dependent and Qualitative Variables in Econometrics. Cambridge: Cambridge University Press. 1983.
4. Joshua D. Angrist and Alan B. Krueger, "Does Compulsory School Attendance Affect Schooling and Earnings?" The Quarterly Journal of Economics 106 (1991), pp. 979-1014.
5. Bartik, T. J., "The Estimation of Demand Parameters in Hedonic Price Models," Journal of Political Economy 95 (1987), pp. 81-88.
6. Qian, H., and P. Schmidt, "Improved Instrumental Variables and Generalized Method of Moments Estimators," Journal of Econometrics 91 (1999), pp. 145-169.
7. Vella, F. "Estimating models with Sample Selection Bias in Censored and Discrete Choice models,"Journal of Applied Econometrics 7 (1992), pp. 413-421

Evaluation criteria:

1.Written Examination	(Test 1) -	30% [Module 1-2]
2.Lab Practical	(Test 2) -	30% [Modules 1-2]
3.Major Exam	(Test 3) -	40% [Modules 1-2]

Learning outcomes:

After completing this course the students will be able to

1. Distinguish modelling issues relating to panel and non-linear regression modelling [Tests 1and Test 3]
2. Analyse problems that seek solutions through panel and non-linear regression. [Test 2]
3. Proficiency in statistical software. [Test 2]

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

Course reviewers:

1. Prof. Octavio Ramirez, Head and Professor, University of Georgia, USA.
2. Prof. Subrata Sarkar, Professor, IGIDR.
3. Prof. Abhiroop Mukhopadhyay, Associate Professor, ISI, Delhi.