

Course title: Econometrics I				
Course code: MPE 186		No. of credits: 4	L-T-P: 57–0– 6	Learning hours: 60
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 offered in: Semester 1	
Course type: Core				
Course description: This course introduces the theories of statistics and econometrics and provides an insight into their applications to economic problems. The course starts with fundamental concepts random variables. After a discussion of some special families of distributions that are widely used in economic applications, the students are introduced to estimation and hypothesis testing. These concepts create a foundation for the subsequent modules on estimation and inference in regression models. The course also emphasizes a discussion of challenges and limitations of regression analysis. The students learn the techniques for preparing raw data for analysis, summarisation, and visualisation of data, and carrying out basic econometric analysis using software such as STATA and R. This course also creates a foundation for advanced econometrics classes and research methods.				
Course objectives: 1. To provide a foundation of Statistics and Econometrics for undertaking data analysis in Economics. 2. An exposure to various theories of Statistics and Econometrics, along with a demonstration of their applications. 3. To introduce students to use of statistical software for data analysis.				
Course contents				
Module	Topic	L	T	P
1	Introduction Meaning of ‘statistics’ Observational versus experimental data Structure of economic data	2	0	0
2	R/STATA Software – Part 1 Tools of exploratory data analysis.	0	0	2
3	Random Variables Discrete and continuous random variables Joint, marginal and conditional distributions and statistical/stochastic independence Measures of central tendency and their properties Measures of dispersion and their properties Measures of association and their properties Central limit theorem and law of large numbers.	6	0	0
4	Selected Special Distributions Binomial distribution Poisson distribution Uniform distribution Normal, standard normal and log-normal distributions Exponential distribution Chi-square, t and F distributions	6	0	0
5	Estimation Populations, parameters, and random sampling Estimation of population mean, population proportion and population variance Finite Sample and Asymptotic Sample Properties of estimators Different approaches to parameter estimation: method of moments; maximum likelihood; least squares Point and interval estimation	10	0	0
6	Hypothesis Testing Setting up a hypothesis test Type 1 and type 2 errors	5	0	0

	Level of significance Power of a test Hypotheses tests involving 2 populations: independent 2 sample t tests, paired t-tests, tests of equality of population proportions; variance ratio test; chi square test of independence. Relationship between hypothesis testing and confidence intervals			
7	Simple Regression Model Derivation of OLS estimates Properties of OLS estimators Gauss-Markov assumptions for simple regression Log-log and semi-log regression models	8	0	0
8	Multiple Regression Model: Estimation Derivation of OLS estimates Interpretation of coefficients Gauss-Markov assumptions and theorem for multiple regression	10	0	0
9	Multiple Regression Model: Inference Sampling distributions Testing hypotheses in OLS: t test and F test Confidence intervals in OLS	5	0	0
10	Gauss Markov violations Heteroskedasticity Endogeneity	3	0	0
11	R/STATA Software – Part 2 Regression analysis Reporting and interpreting results	0	0	4
12	Way forward Introduction to time series data analysis Introduction to limited dependent variable models	2		
	Total (in hours)	57	0	6

Evaluation criteria:

1. **Assignments (Across all modules)** - 10%
2. **Minor Test 1**-(Modules 1, 3, 4, 5, 6) - 25%
3. **Minor Test 2**– software based (Modules 2, 11, application of knowledge from all modules) - 25%
4. **Major Test**-(Modules 7, 8, 9, 10) - 40%

Learning outcomes:

At the end of this course, students will be able to

1. Build a knowledge base of the fundamental principles of Statistics and Econometrics (Evaluation criteria 1,2 and 4)
2. Develop expertise in the principles, techniques and approaches used for statistical inferences (All evaluation criteria)
3. Apply statistical and econometric concepts to economic models (All evaluation criteria)
4. Ability to use R/STATA for summarising and visualization of data; correlation and regression analyses; and reporting and interpreting software outputs (Evaluation criteria 3)

Study Materials:

1. *DeGroot, M. H., and M.J. Schervish. 2012. *Probability and Statistics*. 4th Ed., Pearson India.
2. Mood, A. M., F. A. Graybill, and D. C. Boes. 1974. *Introduction to the Theory of Statistics*. 3rd Ed., New York: McGraw Hill.
3. Casella, G, and R.L. Berger. 2002. *Statistical inference*. 2nd Ed., Pacific Grove, Calif: Duxbury.
4. Crawley, M. J. 2014. *Statistics: An Introduction Using R*. 2nd Ed. Chichester: John Wiley & Sons.
5. *Wooldridge, J.M. 2007. *Introductory Econometrics: A Modern Approach*, 7th Edition, Boston: Cengage
6. Greene, W. H. 2003. *Econometric Analysis*, 5th edition, New Jersey: Prentice Hall.
7. *Dayal, V. 2015. *An Introduction to R for Quantitative Economics*, New Delhi: Springer.
8. 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: The students registering for this course are advised to review concepts of mathematics of 10+2 level

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

Prepared by: Seema Sangita

Course Reviewers:

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