Course title: Time series and regression analysis			
Course code: MPE 177	**No. of credits:** 3	**L-T-P:** 42-0-0	**Learning hours:** 42
Pre-requisite course code and title (if any): None			
Department: Department of Policy Studies			
Course coordinator: Dr. Kavita Sardana	**Course instructor:** Dr. Kavita Sardana		
Contact details: kavita.sardana@teriuniversity.ac.in			
Course type: Elective	**Course offered in:** Semester 3		

Course description:
The aim of this course is to provide students with the essential expertise to handle modern time series techniques. Idea is to introduce students to comprehensive set of tools and techniques for analysing various forms of univariate and multivariate time series and for understanding the current literature in applied time series. After the course students will also be able to appreciate and apply key concepts of estimation and forecasting in a time series context. Endeavor will be to provide simple examples that illustrate how the theoretical results are used and applied in Practice.

Course objectives: The overarching objective of this course is to learn and apply statistical methods for the analysis of data that have been observed over time. Also, the objective would be to learn how to overcome challenges to account for the correlation between measurements that are close in time.

Course contents

Module	Topic	L	T	P
1	**Theory of Univariate Time Series** **Study assumptions and properties of univariate processes.** • Normal (Gaussian) White Noise • White Noise • AR(1) Process • Random Walk • Lag Operators – Notation • AR(2) Process • AR(p) Process • Partial Autocorrelation Function • PACF • MA Process • Invertibility • Examples • Autocorrelations for a random • walk • The ARMA(p, q) Process • Impulse Response Sequence • Integrated processes	8		4
2	**Econometric Modeling of Time Series** **Testing properties of both univariate and multivariate time series.** 1. Time Series Properties of Macro Variables 2. Testing for Unit Root: 3. Cointegration Analysis 3.2.1 Some Relevant Mathematical Notions: Matrices, Eigen values • The Engel-Granger (EG) Approach • The Johansen Approach • Identification of the beta coefficient and Restriction Tests: With one or more cointegrating vector(s) 4. VAR and Error Correction Modelling • The Engel-Granger (EG) Approach	12		8

	• The Johansen Approach: With one or more cointegrating vector(s)			
3	**The Econometric Forecasting:Theory and Application** **Theory and practical of forecasting** 1. Graphic Method of Forecasting 2. Modeling Trends, Seasonality and Cycles: MA, AR, ARIMA 3. Forecasting with Regression • VAR Model and Forecasting • Diagnostic Checks for Forecasting • Scenarios Analysis and Impulse Response	7		4
	Conditional Hetroscedasticity: 1. Univariate GARCH Models 2. Multivariate GARCH Models	6		2
	Total	**33**		**18**

Evaluation criteria:
Two midterm exams
(Module 1 and Module 2): 25%
Problem sets and Practicals
(Module 1, 2, and 3): 25%
Major exam
(Module 1, 2, and 3): 50%

Learning outcomes:
After completing this course the students will be able to
Distinguish problems in econometrics relating to cross-section and time series (Mid-terms exam1)
To theoretically and empirically formulate problems that can be resolved using time series analysis (Mid-term 1 and 2, finals, and Problem sets and Practicals).

Pedagogical approach
Classroom teaching − Importance of practicals and software applications

Materials

Compulsory Readings
Module 1
Theory of Univariate Time Series
Chapter 10; Introductory Econometrics: A Modern Approach by Woolridge*.

Module 2
Chapter 11,
Econometric Modeling of Time Series
12 and 18; Introductory Econometrics: A Modern Approach by Woolridge*.

Module 3:
Chapter 12 and 18; Introductory Econometrics: A Modern Approach by Woolridge*.

Suggested Readings:
1. Stock and Watson (2003) Chapter 12-16
2. Green (2003 or 2008) Chapter 11, 12, 19, 20

Journals:
Review of Economics and Statistics

Software: The course places heavy emphasis on using software to analyze data. Software that one mostly works with is STATA.

Additional information (if any): None

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

Course reviewers:
The course is reviewed and commented by the following experts.
1. Dr Bharat Ramaswami Indian Statistical Institute
2. Dr Abhiroop Mukhopadhyay, Indian Statistical Institute

Prepared by Kavita Sardana