Birla Institute of Technology & Science, Pilani
Hyderabad Campus

SECOND SEMESTER 2023-2024
Course Handout Part II

Date: 09-01-2024

In addition to part-I (General Handout for all courses appended to the time table) this portion gives further specific details regarding the course.

Course No.   : ECON F342
Course Title   : Applied Econometrics
Instructor-in-Charge   : Rishi Kumar

Scope and Objective of the Course: This is an applied course, emphasizing on the implementation of econometric techniques to analyze concrete economic problems, using different data and econometric software. Though it is not a theoretical course, we will introduce some advanced econometric theory and concepts to implement an appropriate use of econometric methods. The basic objective of the course is to learn the process of econometric models' implementation and testing in analysis and problem solving. Students will learn how to choose the adequate method, its assumptions, and correctly interpret its results and to translate them into meaningful answers.

Textbooks:
1. Jeffrey M. Wooldridge, Introductory Econometrics- A Modern Approach, 6th Edition, Cengage Learning, 2016

Reference books
1. Jeff Wooldridge, Econometric Analysis of cross section and panel data, MIT press, 2002
2. Joshua D. Angrist and Jörn-Steffen Pischke, Mostly Harmless Econometrics- An Empiricist's Companion, Princeton University Press, 2009.
3. R. Carter Hill, William E. Griffiths and Guay C. Lim, Principles of Econometrics, 5th Edition, Wiley, 2018.
4. James H. Stock and Mark W. Watson, Introduction to Econometrics, Second Edition, Pearson Addison-Wesley, 2007
5. Dimitrios Asteriou & Stephen G. Hall, Applied Econometrics, 4th Edition,   Bloomsbury Publishing, 2022
6. Greene, W., Econometric Analysis, 7th Edition, Prentice Hall, 2011
7. G.S. Maddala, Introduction to Econometrics, Second Edition, MacMillan, 1992
8. Damodar. N. Gujarati and Sangeetha, Basic Econometrics, Fourth Edition, Tata McGraw-Hill Publishing Company Limited, 2007
9. Brooks, C., Introductory Econometrics for Finance. Cambridge university press, 2014.

Course Plan:

Lecture No.	Learning objectives	Topics to be covered	Chapter in the Text Book
1	Introduction to Applied Econometrics	Introduction: Scope and Coverage	T1: CH-1 and Class Notes
2-8	Simple Regression Model & Multiple Regression Model	Estimation and Inference Simple Regression Model, The General Linear Model Violating the Assumptions of the Classical regression model, Alternate Functional Forms, Multiple Regression: Motivation, Mechanics and Interpretation, Omitted Variable Bias, Dummy Variables.	T1: CH-2, 3 & 4 and Class Notes
9-14	Panel Data	Pooling Independent Cross Sections across Time, Two-Period Panel Data Analysis, Fixed Effects Estimation, Random Effects Models & DWH test	T1: CH-13 & 14 and Class Notes
15-28	Time Series Data	Moving average processes; Autoregressive processes; ACF & PACF; ARMA processes; Building ARMA models: the Box–Jenkins approach; Modeling Dynamic Relationships; Autocorrelations; Stationarity and Weak Dependence; Forecasting; Testing for Granger Causality; Testing for Serially Correlated Errors; Finite Distributed Lags; Infinite Distributed Lags	T1: CH-18; R3 CH-9 & CH-12 and Class Notes
29-30	Maximum Likelihood Methods	Estimation and hypothesis testing using MLE methods	Class Notes
31-36	Discrete Response models	Binary dependent and Linear Probability Model; Logit and Probit Models for Binary Response; The Tobit Model; Count and Censor Data	T1: CH-17 and Class Notes
37-38	Instrumental variables estimation	IV Estimation, Two Stage Least Squares, Testing for Endogeneity.	T1: CH-15 and Class Notes
39-42	Experimental & Nonexperimental Designs	Randomized Controlled Trial, Difference-in-Differences Estimates, Propensity Score Matching, Regression Discontinuity Design, Interrupted Time Series & Instrumental	Class Notes
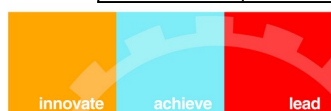
		Variables	

Learning Outcome:

Topic 1: Introduction to Applied Econometrics

In this introductory topic students will be introduced to the subject. The motivation for learning applied and wide practical application across various fields will be discussed. The main objective will be to stir the interest among pupils for the subject.

Topic 2: Simple Regression Model & Multiple Regression Model

To strengthen the foundation for upcoming concepts, the students will be taken through the techniques of simple and multiple regression. The topic will help students refresh their understanding the theory and techniques of regressions

Topic 3: Panel Data

Given the wide applicability of methods of panel data in academic as well as practical world, the students will understand the theory behind the panel data regression including fixed effects, first differencing and random effects models and learn to apply the methods to the real world data.

Topic 4: Time Series Data

Under this topic, the concepts of moving average and autoregressive processes will be introduced along with ARMA processes and models. The discussion will focus on partial autocorrelation function and Box–Jenkins approach. This module will help grasp the basics of time series which will help students understand more complex and advanced concepts. Further, this module will be focussed on modelling dynamic relations. The students will be introduced to the very important concept of stationarity and weak dependence. The commonly used granger causality will also be explained. We will also learn techniques to test for serially correlated errors and also modelling them. We will also investigate the nature of nonstationary variables, examine the consequences of using them in regression analysis, introduce tests for stationarity, and learn how to model regression relationships that involve nonstationary variables.

Topic 5: Maximum Likelihood Methods

These couples of lectures will help students appreciate maximum likelihood methods approach to regression analysis. This will help them understand the time series analysis and discrete response models better.

Topic 6: Discrete Response models

In this section, the students will be introduced to the concepts of discrete response models. Specifically, the concepts of binary dependent and linear probability model, probit, logit, tobit models will be discussed in detail and students at the end of this part will be able to work on practical problems involving count and censor data.

Topic 7: Instrumental variables estimation

Here the students will learn the technique of Instrumental Variables and 2SLS which comes very handy in case of endogeneity of the data especially when dealing with the real-life data.

Topic 8: Experimental & Nonexperimental Designs
In the concluding part of this course, the students will be introduced to the Experimental & Nonexperimental Designs. Various evaluating techniques like Randomized Controlled Trial, Difference-in-Differences, Propensity Score Matching, Regression Discontinuity, Interrupted Time Series & Instrumental Variables will be discussed.

Evaluation Scheme:

Component	Duration	Weightage (%)	Date & Time	Nature of Component
Assignment-I	-	10	To be announced	OB
Mid-Semester Exam	90 min.	30	13/03 - 2.00 - 3.30PM	CB
Assignment-II	-	10	To be announced	OB
Assignment-III	-	10	To be announced	OB
Comprehensive Exam	3 hrs.	40	11/05 AN	CB

Chamber Consultation Hour: To be announced in the class.

Notices: All notices pertaining to this course shall be displayed on the **Economics and Finance (or) CMS Notice Board.**

Make-up Policy: Make-up will be granted only on genuine grounds and if prior permission is taken. Make-up application via sms/ messages is not acceptable; only communication through official email will be entertained.

Academic Honesty and Integrity Policy: Academic honesty and integrity are to be maintained by all the students throughout the semester and no type of academic dishonesty is acceptable.

INSTRUCTOR-IN-CHARGE
ECON F342