

**Indian Institute of Technology Kanpur
Proposal for a New Course**

1. Course No: ECO351

2. Course Title: Econometrics II

3. Per Week Lectures: 3 (L), Tutorial: 1 (T), Laboratory: 0 (P), Additional Hours: 0

Credits: (3*L+T +P+A): 11 credits

Duration of Course: Full Semester Course

4. Proposing Department: Economic Sciences

Other Departments which may be interested: None

5. Proposing instructor: Faculty members of the Department of Economic Sciences

Level of the course: UG

6. Course Description:

A) Objectives: The principal objective of the course is to introduce the students to some advanced and sophisticated econometric models, discuss estimation of the models and how to make proper inferences. The course is aimed to give an overview of “what lies beyond linear and binary regression”, and emphasis is placed on breadth, not depth. The course will enable the students with sufficient econometric/statistical tools in their armory to pursue applied research either in Undergraduate (UG) or MS projects.

Note that this is a re-design of the current course ‘ECO342A: Econometrics II’.

B) Contents

S. No.	Broad title	Topics	No. of Lectures*
1.	Linear Regression with Variation to Continuous Outcomes	Truncated regression models, censored regression models, Heckman’s sample selection models. Estimation and inference. Real-world applications.	6

2.	Linear Regression and Endogeneity	Problems due to endogeneity. Solutions to endogeneity such as instrumental variable approach. Real-world applications.	4
3.	Treatment Effect Models	Modeling, Estimation and Inference. Average Treatment Effect, Causality. Real-world applications.	6
4.	Ordinal Models	Ordered Probit model. Estimation and inference. Real-world applications	4
5.	Models for Unordered Multiple Choices	RUM framework, multinomial logit, conditional logit, nested logit. Estimation and inference. Real-world applications.	6
6.	Panel Data Models	Fixed-effect model, random-effect model, mixed-effect model. Estimation and inference. Real-world applications.	6
7.	Time Series Models	AR process, MA process, ARMA model, ARIMA model, ARCH, GARCH	4
8.	Miscellaneous/Additonal Topics.	When to employ quantile regression. Advantages of quantile regression. Estimation and inference. Real-world applications.	4

*50-minute lecture each, total of 40 lectures.

C) Prerequisites: ECO251: Econometrics I.

D) Short summary for including in the Courses of Study Booklet: This is the second level course in econometrics designed to discuss econometrics models (beyond the linear and binary outcome models) which are necessary to deal with important micro-econometric applications

such as returns to schooling, female labor participation, modelling survey responses, and repeated observations on a cross-section giving rise to panel/longitudinal data. The course will focus on the estimation of the models, the theoretical properties of the estimators, how to make inference and finally apply the models on real-world econometric problems. Maximum Likelihood (ML) technique will be the method of choice for estimating most these models.

The lectures will introduce the theoretical aspects of the econometric models, their estimation and inference. We will complement the lectures by a variety of real-world applications on actual data sets through homework assignments and lab classes. Students are expected to implement the knowledge gained from the class to real-world applications to gain a complete understanding of the econometric problem. The course will include use of R, MATLAB or other similar software.

7) Recommended textbooks:

Econometric Analysis, by William Green. Pearson, 8th Edition. 2018.

Microeconometrics, by A. Colin Cameron and Pravin K. Trivedi, Cambridge University Press, Cambridge, 2005.

Ordinal Data Modeling (Statistics for Social and Behavioral Sciences), by Valen E. Johnson and James H. Albert, Springer, 2000.

Discrete Choice Methods with Simulation, by Kenneth E. Train, Cambridge University Press, Cambridge, 2nd Edition, 2009.

Quantile Regression (Econometric Society Monographs), by Roger Koenker, Cambridge University Press, Cambridge, 2005.

DUGC Approval Date

Signature of DUGC Convener

The course is approved/not approved.

Chairperson, SUGC