BIRLA INSTITUTE OF TECHNOLOGY AND SCIENCE, PILANI, Pilani Campus

SECOND SEMESTER 2015-2016

Course Handout Part II

Date: 10/01/2016

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. : CE G539

Course Title : Introduction to Discrete Choice Theory

Instructor In-Charge: Prasanta K Sahu

Course Description:

Many aspects of engineering, planning, and policy involve a human element, be it consumers, businesses, governments, or other organizations. Effective design and management requires understanding this human response. This course focuses on behavioural theories and the use of quantitative methods to analyse human response. A mix of theory and practical tools are covered, with applications drawn from infrastructure investment and use, urban growth and design, health, and sustainability. Through case studies and a class project, you will gain hands on experience with behavioural theory, data collection, model development, and analysis.

By the end of the course, you should be able to (1) employ quantitative behavioural analysis in your research and profession and (2) critically analyse models as you come across them throughout your careers. This is a 4 unit graduate course. Undergraduate students can take the course subject to instructor approval. Good knowledge on statistics and calculus are prerequisites.

Scope and Objective:

This course will provide the student with an understanding of the theory and models of individual choice behaviour. The course builds on econometric modelling approaches to develop guidelines for the formulation and estimation of models of choice behaviour and their use in service and product design, marketing and prediction. Practical problems will be assigned to give students familiarity with models discussed in class. These problems will focus on choice behaviour in the context of travel demand analysis. However, the class instruction/discussion will be general and will focus on theory and modelling methodology for application to any discrete choice context.

Text Books:

- T1 Moshe Ben-Akiva and Steven R. Lerman; *Discrete Choice Analysis Theory and Application to Travel Demand;* MIT Press, 1985.

Reference Books:

- R1 Hensher, D., Rose, J. and Greene, W., *Applied Choice Analysis*, Cambridge University Press, 2005
- Handouts will be distributed time to time.

Course Plan:

Lecture No.	Topics to be covered	Reference* Chap./Sec. # (Book)
1 to 3	Introduction and overview, element of choice process	Chapter 1/ T1
4 to 6	Utility-based choice theory	Chapter 1/ T1 and Chapter 1 / R1
8 to 10	Binary choice models: Deterministic and random terms	Chapter 2/T1/R1
11 to 12	Binary choice models: Choice probabilities and invariance to utility scale and location	Chapter 2/T1
13 to 14	Binary choice models: Maximum likelihood estimation	TBA*
15 to 16	Binary choice models: Fit measures	TBA
17 to 18	Binary choice models: Empirical specification and interpretation	TBA
19	Binary choice models: Marginal/elasticity effects and aggregation issues	TBA
20	Multinomial logit model (MNL): Overview and structure	TBA
21 to 22	MNL: Estimation and basic specification	TBA
23	MNL: Properties and elasticity/marginal effects	TBA
24 to 25	MNL: Data requirements and structure	TBA
26	MNL: Application and interpretation	TBA
27	MNL: Specification refinements	TBA
28	MNL: Market segmentation and testing	TBA
29 to 30	Nested logit model (NL): motivation and formulation	TBA
31	NL: Choice probabilities	TBA
32	NL: Implied competitive structure and estimation	TBA
33 to 34	NL: Testing alternative structures and application	TBA
35 to 36	Ordered-response models (OR): theory and structure	TBA
37 to 38	OR: Estimation and elasticity/marginal effects	TBA
	OR: Application and comparison with MNL	TBA
39 to 40	Introduction to advanced discrete choice models	TBA

*TBA = To Be Announced

Evaluation Scheme:

EC No.	Evaluation Component	Duration	Weightage	Date, Time & Venue	Nature of Component
1	Mid-semester test	90 min	30	14/3 11:00 - 12:30 PM	Close book examination
2	Comprehensive	3 hours	40	3/5 AN	Close book examination
3	Assignments/ Term paper/ project		20		Home assignments, seminars, term papers.
4	Seminar		10		

Chamber Consultation Hour: ***To be announced in the class***
Notices: ***Watch Civil Engineering Group Notice Board***

Make-up Policy:

1. **Make-up will be granted only on genuine reasons. However, prior permission is must.**
2. **For medical cases, a certificate from the concerned physician of the Medical Centre must be produced.**

Instructor-in-charge