Course Type	Course Code	Name of Course	L	T	P	Credit
DC	NCEC529	Travel Behaviour Modelling	3	1	0	4

Course Objective

This course aims to provide an in-depth knowledge to a student on the various tools used to examine travel behaviour of an individual or a group. It will focus on enhancing the concepts of travel behaviour theories, discrete choice modelling, activity-based models, GIS applications, Intelligent Transportation Systems (ITS), and emerging mobility trends. Students will develop expertise in transport demand forecasting, policy analysis, and advanced computational modelling at the end of this course.

Learning Outcomes

Upon successful completion of this course, the students should be able to:
- Develop a fundamental understanding of travel behavior theories and their applications in transportation planning.
- Design and analyze stated preference (SP) and revealed preference (RP) surveys for travel demand estimation.
- Exposure to R software and other tools (i.e., QGIS, SPSS, STATA, etc) for travel behavior modeling and analysis.
- Understand the role of TPB, BE, and PT in shaping modern mobility patterns.

Unit No.	Topics to be Covered	Contact Hours	Learning Outcome
1	**Introduction:** Definition & Importance of Travel Behaviour Modelling, Factors Influencing Travel Decisions, Decision makers and their options, Comparison of Traditional and Emerging Approaches in Travel Behaviour, Policy Implications of Travel Behaviour Modelling,	3L	Understanding the role of travel behaviour modelling in transport planning and policy-making.
2	**Survey Design & Analysis:** Role of travel surveys in transport planning, Survey methods: household travel surveys, panel surveys, on-board transit surveys; Precision and accuracy in travel surveys; Sampling design: types of sampling, sample size determination; Survey format and administration; Stated Preference (SP) & Revealed Preference (RP) Data Collection; Pilot surveys and pre-testing techniques; Data cleaning and preprocessing for modelling	6L+ 2T	Learn how to design, conduct, and analyse travel surveys for behavioural research.
3	**Discrete Choice Models (DCM) in Travel Behaviour:** Fundamentals of Random Utility Maximisation (RUM) Theory, Logit Models: Binary choice models, multinomial choice models, issues in model specification, methods and statistics of model estimation with emphasis on maximum-likelihood estimation, elasticity and forecasting with	12L + 5T	Gain proficiency in discrete choice modelling for transport planning

		discrete choice models, Travel behaviour adaptation to policies (e.g., congestion pricing, tolls), ordered choice models, nested logit models, introduction to advanced concepts such as accommodating unobserved population heterogeneity in choice behaviour, simultaneous modelling of multiple discrete continuous outcomes		
4	**Role of Theory of Planned Behaviour (TPB) on Travel:** Introduction to TPB concepts: attitudes, subjective norms, and perceived behavioural control, Travel satisfaction and willingness-to-pay (WTP), Behavioural response to emerging mobility trends, Introduction to Structural Equation Modelling (SEM), Latent Variables & Confirmatory Factor Analysis (CFA), Application of SEM in travel behaviour domain	7L+3T	Understanding the role of psychological theories to understand and predict travel behaviour.
5	**Built Environment (BE) & Travel behaviour:** Relationship between urban form and travel behaviour, Introducing the concept of job-housing balance and trip chaining, Role of 5D's of BE - Density, Diversity, Design, Destination Accessibility, Distance to Transit on travel behaviour, Definition of accessibility vs. mobility, Evaluating accessibility using GIS-based spatial analysis, Policies for sustainable urban mobility	7L+2T	Understanding the influence of urban planning, land-use patterns, and the built environment on travel behaviour
6	**Travel Behaviour in Public Transport (PT):** Role of public transport in sustainable mobility, Factors influencing mode choice: cost, time, convenience, reliability, Psychological aspects: perceived safety, comfort, and crowding effects, Public vs. private transport preferences: Behavioural differences, Elasticity of demand & fair variations, Factors affecting service quality: waiting times, frequency, reliability, Last-mile connectivity solutions: e-bikes, feeder buses, micro transit, Introduction to MaaS (Mobility-As-A-Service)	7L + 2T	Understanding the behavioural drivers of public transport ridership, policy interventions to increase transit adoption
	Total Contact Hours	42L+14T	

Text Books:
1: Ortúzar, J. D., & Willumsen, L. G. (2011). Modelling Transport. Wiley.
2: Train, K. (2009). Discrete Choice Methods with Simulation. Cambridge University Press.
3: Louviere, J. J., Hensher, D. A., & Swait, J. D. (2000). Stated Choice Methods: Analysis and Applications. Cambridge University Press.

Reference Books:
1: Gärling, T., Ettema, D., & Friman, M. (2014). Handbook of Sustainable Travel. Springer.
2: Hensher, D. A., Rose, J. M., & Greene, W. H. (2005). Applied Choice Analysis: A Primer. Cambridge University Press.
3: Gehl, J. (2010). Cities for People. Island Press