

EMERGING METHODS FOR ACTIVITY-TRAVEL DEMAND MODELING AND SIMULATION

Global Initiative of Academic Networks

National Institute of Technology-Warangal, 26-30 December, 2016

Course Outline

Instructor	Institution	Email
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Course Description

The course covers emerging activity-based analysis techniques for simulating traveler choices and forecasting travel demand under a wide variety of socio-economic, demographic, built environment, modal, and network scenarios; new computational activity-based travel forecasting and modeling tools based on the principles of microsimulation will be taught in this course; course content includes hands-on exercises in the use of activity-based travel modeling tools; students will learn the interpretation and use of activity-based model outputs for transportation planning and policy analyses.

Course Objectives

The primary objectives of the course are as follows:

- i) Provide participants a thorough knowledge of the principles of activity-based approaches to travel demand forecasting
- ii) Equip participants with the ability to apply activity-based travel modeling and simulation tools for addressing transportation planning and infrastructure management issues
- iii) Provide participants an understanding of methodological frameworks and microsimulation paradigms that may be used to estimate choice model components embedded in activity-based travel demand models
- iv) Provide course participants with a deep appreciation for computational issues and considerations such as model convergence, integrated transport model development, internal consistency and validity of model systems, and behavioral phenomena
- v) Discuss with course participants, strategies for implementing, adopting, and adapting the activity-based approaches to travel demand modeling in developing country contexts
- vi) Identify the input data required for model estimation and application, and how and where the requisite data may be obtained in an efficient and cost-effective manner in a developing country context

Course Materials

The following course material will be provided to the participants during the course.

- Course notes
- Project files and codes for class projects

Course Schedule

Module	Day	Time	Topic
Module A Overview of Activity-Based Modeling Frameworks	Dec, 26 Monday	9:00 – 10:30 AM	Introduction to activity-based travel demand modeling; foundations of microsimulation-based paradigms and agent-based models
		10:45 AM – 12:15 PM	Description of selected activity-based travel demand modeling systems; fundamentals of behavioral data exploration and hypothesis testing
		1:45 – 3:15 PM	Tutorial 1: Exploring travel behavior data; importance and assessment of data quality and representativeness; hands-on exercise in travel data analysis
		3:30 – 4:30 PM	Project/Quiz 1: Statistical analysis of activity-travel behavior characteristics
	Dec, 27 Tuesday	9:00 – 10:30 AM	Synthetic population generation; importance of population synthesis for activity-based travel modeling
		10:45 AM – 12:15 PM	Description of PopGen synthetic population software package; detailed explanation of methodology and approach embedded in PopGen
		1:45 – 3:15 PM	Tutorial 2: Application of PopGen for population synthesis; setup of input data; identification of household and person level controls; identification of spatial unit of geography; goodness of fit of synthetic population
		3:30 – 4:30 PM	Project/Quiz 2: Population synthesis using PopGen
Module B Choice Model Estimation	Dec, 28 Wednesday	9:00 – 10:30 AM	Overview of choice model components in activity-based model systems; review of discrete choice modeling methods
		10:45 AM – 12:15 PM	Multinomial logit model, nested logit model, ordered probit model, and count models
		1:45 – 3:15 PM	Tutorial 3: Estimation of discrete choice model components using household travel survey data; interpretation of model outputs
		3:30 – 4:30 PM	Project/Quiz 3: Discrete choice model estimation and interpretation

Module C Advanced Modeling Methods	Dec, 29 Thursday	9:00 – 10:30 AM	Discrete-continuous choice modeling methods; multiple discrete-continuous choice processes; model formulation and error assumptions
		10:45 AM – 12:15 PM	Estimation of multiple discrete-continuous extreme value (MDCEV) model; modeling tour structure/composition
		1:45 – 3:15 PM	Tutorial 4: Estimation of multiple discrete-continuous extreme value (MDCEV) model using household travel survey data; interpretation of model output and satiation parameters
		3:30 – 4:30 PM	Project/Quiz 4: Multiple discrete-continuous extreme value (MDCEV) model formulation; MDCEV model estimation; model output/parameter interpretation
Module D Application of Choice Models	Dec, 30 Friday	9:00 – 10:30 AM	Application of choice models, including MDCEV model, in forecasting mode; agent-based microsimulation algorithms; simulation of agent choices
		10:45 AM – 12:15 PM	Case studies in application of activity-based choice models; vehicle fleet composition model system
		1:45 – 3:15 PM	Tutorial/Project 5: Application of discrete choice models in a microsimulation platform; demonstration of the MDCEV forecasting code
		3:30 – 4:30 PM	Q & A session; General discussion