

Course syllabus

Department of Civil Engineering, Indian Institute of Technology Madras

CE5390- Analytical Tech. in Transportation Engg

Credit Distribution: C:9 L:3 T:0 P:0 E:0 O:6 TH

Course Type: Theory

Description: Probabilistic analysis of transportation systems: Axioms and principles, probability density and mass function, cumulative distribution functions, and common distributions; probabilistic modelling of demand, supply, loading, headways and arrivals in transportation systems, statistical characterisation of means, variance, distributions, and moments of performance functions (travel time, distance, speed, waiting times etc.); applications to traffic flow, transit operations, urban travel services, passenger characteristics, freight travel analysis. Statistical models and Transportation Applications: Sampling and Hypothesis testing (for means and variances), consistency, bias, power, and efficiency in statistical models; linear models – linear regression, analysis of variance, applications in trip generation, demand, and travel quantification; introduction to discrete choice models binary, multinomial logit, and ordered frequency models applied to disaggregate travel choice analysis. Optimisation Techniques: Basic concepts; linear programming – simplex method, duality and applications to minimum cost and transportation problems; Formulation of transportation problems as mathematical programs (scheduling, routing, distribution, facility location, network equilibrium, network design, crew scheduling etc.)

Course Content: Probabilistic analysis of transportation systems: Axioms, pdf, pmf, cdf and common distributions; probabilistic modeling of demand, supply, loading, headways and arrivals in transportation systems, statistical characterization of means, variance, distributions, and moments of performance functions (travel time, distance, speed, waiting times etc.); applications to traffic flow, transit operations, urban travel services, passenger characteristics, freight travel analysis. Applied Statistical Models: Sampling and Hypothesis testing (for means and variances), consistency, bias, power, and efficiency in statistical models; Linear models – linear regression, analysis of variance, applications in trip-generation, demand, and travel quantification; Discrete Choice Data and Models: Introduction to discrete choice models – binary, multinomial logit, mixed logit and count based models applied to disaggregate travel choice analysis.

Text Books NIL

Reference Books : NIL

Prerequisite: NIL