

Course syllabus

Department of Civil Engineering, Indian Institute of Technology Madras

CE6870 - Transportation Systems Analysis

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

Course Type: Theory

Description: Introduction to transportation systems, interrelationships with the human activity and economic systems, their impacts on resource utilisation and human environment; Transportation innovations; Demand modeling, prediction, energy profile, entropy as accessibility index; Design, analysis, and evaluation of transportation networks; Urban transportation problems and prospects, need for integrated transportation systems at the city and regional level; Broad policy framework; Intelligent Transportation Systems functional areas, technology applications.

Course Content: Overview of transportation systems; Systems approach - Interactive systems, transport-land use cycle, system planning process, transportation planning process; feedback loops; Advanced technology applications - Intelligent Transportation Systems (ITS) - Functional areas, technologies, issues and challenges; Further topics in travel demand analysis - Comments on four-step urban transportation planning process, ITE's trip generation methodology, theoretical methods to establish O-D trip tables and related issues, traffic assignment; heuristic equilibrium methods, user equilibrium (UE) concept, Wardrop's principles and mathematical formulation, graphical solution to UE problem. Urban transportation network analysis - System optimal (SO) versus user optimal network flows; concepts and implications in traffic management, formulations and comparison; Braess's Paradox; concept and illustration; UE with elastic demand or varying demand; concept, formulation and illustration; Dynamic traffic assignment - concept, algorithm, illustration, issues and challenges; Economic evaluation of transportation alternatives; principles, road user cost factors, benefit-cost analysis; method and illustration.

Text Books: NIL

Reference Books: NIL

Prerequisite: NIL