



INTRODUCTION TO MULTIMODAL URBAN TRANSPORTATION SYSTEMS (MUTS)

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INTENDED AUDIENCE : UG Civil Engineering, PG Civil Engineering (Transportation), UG Urban Planning, PG Urban Planning

INDUSTRY SUPPORT: Urban Local Bodies, Transport Network Companies (TNCs), Public transportation operating companies and administrators

COURSE OUTLINE :

This course is refined version of the Post-Graduate course (ID6004) "Planning, Operation and Management of Transportation Facilities" which is being currently taught to the students of Infrastructure Design and Management at IIT Kharagpur. The course's primary objectives are to:

1. Identify the sustainability principles in transportation
2. Introduce the concept of Travel Demand Management (TDM)
3. Disseminate the techniques of urban public transit planning, operations and management
4. Imbibe the concepts of non-motorized urban transport
5. Demonstrate the applications in intelligent transportation systems (ITS)

ABOUT INSTRUCTOR :

Prof. Arkopal K. Goswami is currently a faculty member in the Ranbir and Chitra Gupta School of Infrastructure Design and Management, IIT Kharagpur, where he specializes in Transportation Infrastructure. He earned his Bachelor's in Civil Engineering from NIT Jamshedpur, after which he was awarded a full academic scholarship, along with a research assistantship (RA), to pursue his high studies from the University of Virginia (UVa). He graduated with a Doctorate in Civil Engineering from UVa in the year 2008, under the tutelage of Professor (Emeritus) Dr. Lester A. Hoel. Dr. Goswami specializes in the field of sustainable urban transport, having over 13 years of experience in consulting, public sector, and academia, both in India and United States of America (USA). He is currently a Principal Investigator (PI) of multiple projects that aim to enhance urban transport sustainability in India. To further the cause, Dr. Goswami is collaborating with researchers from around the globe, including Japan, Germany, United Kingdom (UK), and USA. His work has been recognized worldwide, where he has received the Jack H. Dillard best research paper award, and has published in reputed peer reviewed journals including the ASCE Journal of Transportation Engineering, Transport Reviews, and Energy. He has also presented his work at national and international conferences, including the Annual Conference of the Transportation Research Board (TRB), and the World Conference on Transport Research Society (WCTRS). He is a member of the Transportation Research Group (TRG), India; and Eastern Asian Society for Transportation Studies (EASTS). He is currently leading a group of researchers that include 7 PhD students, 8 Masters' students, as well as multiple project personnel. Arkopal loves travelling and is an avid sports enthusiast, where he follows cricket, tennis and basketball.

COURSE PLAN :

Week 1:

Module 1: Overview of urban transportation

- Lec. 1: Urbanization and Transport(0.5 hr.)
- Lec. 2: Key issues in urban transportation (0.5 hr.)
- Lec. 3: Challenges in urban transportation(0.5 hr.)
- Lec. 4: Travel demand modelling overview (0.5 hr.)
- Lec. 5: Vehicular Level of Service (LOS) overview (0.5 hr.)

Week 2:

Module 2: Public Transportation

- Lec. 6: Introduction to public transportation (0.5 hr.)
- Lec. 7: Basic operating elements of public transportation (0.5 hr.)
- Lec. 8: Basic operating elements of public transportation (contd.) (0.5 hr.)
- Lec. 9: Bus Transportation (0.5 hr.)
- Lec. 10: Bus Transportation (contd.) (0.5 hr.)

Week 3:

Module 2: Public Transportation

- Lec. 11: Financing public transportation (0.5 hr.)
- Lec. 12: Transit marketing (0.5 hr.)
- Lec. 13: Rail transportation (0.5 hr.)
- Lec. 14: Intermediate Public Transportation (0.5 hr.)
- Lec. 15: Measuring performance of transit systems (0.5 hr.)

Week 4:

Module 2: Public Transportation

- Lec. 16: Advanced operation concepts of public transportation (0.5 hr.)
- Lec. 17: Bus & Rail Transit Capacity (0.5 hr.)
- Lec. 18: Bus & Rail Transit Capacity (contd.) (0.5 hr.)
- Lec. 19: Station Capacity (0.5 hr.)
- Lec. 20: Transit Stop Location (0.5 hr.)

Week 5:

Module 3: Non-Motorised Transportation (NMT) Planning

- Lec. 21: Introduction to NMT Systems (0.5 hr.)
- Lec. 22: Assessing existing NMT scenario (0.5 hr.)
- Lec. 23: Data collection and analysis in NMT Planning (0.5 hr.)
- Lec. 24: Complementarity and Selection of Interventions (0.5 hr.)
- Lec. 25: Alternative Selection through Economic & Financial Analysis (0.5 hr.)

Week 6:

Module 3: Non-Motorised Transportation (NMT) Planning

- Lec. 26: Introduction to NMT systems (0.5 hr.)
- Lec. 27: Basic NMT Characteristics (0.5 hr.)
- Lec. 28: Pedestrian Data Collection and Flow Characteristics (0.5 hr.)
- Lec. 29: PTS Case Studies Pedestrian flow characteristics on facilities (0.5 hr.)
- Lec. 30: Pedestrian Level of Service (PLOS) based on Flow models (0.5 hr.)

Week 7:

Module 3: Non-Motorised Transportation (NMT) Planning

- Lec. 31: Other types of Pedestrian Level of Service (PLOS) (0.5 hr.)
- Lec. 32: HCM 2010 Methodology for PLOS (0.5 hr.)
- Lec. 33: HCM 2010 Methodology for PLOS (contd.) (0.5 hr.)
- Lec. 34: Bicycle Facilities and Level of Service (BLOS) (0.5 hr.)
- Lec. 35: BLOS and Bicycle Compatibility Index (BCI) (0.5 hr.)

Week 8:

Module 3: Non-Motorised Transportation (NMT) Planning

- Lec. 36: NMT Design Principles (0.5 hr.)
- Lec. 37: Design of Pedestrian Infrastructure (0.5 hr.)
- Lec. 38: Design of Pedestrian Infrastructure (contd.) (0.5 hr.)
- Lec. 39: Design of Cycling Infrastructure (0.5 hr.)
- Lec. 40: Design of Cycling Infrastructure (contd.) (0.5 hr.)

Week 9:

Module 4: Urban Transport & Sustainability

- Lec. 41: Travel Demand Management (TDM) overview (0.5 hr.)
- Lec. 42: Push measures cases (0.5 hr.)
- Lec. 43: Pull measure cases (0.5 hr.)
- Lec. 44: Parking Studies (0.5 hr.)
- Lec. 45: Transit Oriented Development (TOD) (0.5 hr.)

Week 10:

Module 4: Urban Transport & Sustainability

- Lec. 46: Introduction to Intelligent Transportation Systems (ITS) (0.5 hr.)
- Lec 47: ITS components, applications and communication (0.5 hr.)
- Lec. 48: ITS Architecture (0.5 hr.)
- Lec. 49: Electronic Toll Collection (ETC) (0.5 hr.)
- Lec. 50: Public Bicycle Sharing (PBS) System with ITS (0.5 hr.)

Week 11:

Module 4: Urban Transport & Sustainability

- Lec. 51: Multimodal transportation (MMT) environment (0.5 hr.)
- Lec. 52: Multimodal Level of Service (MMLOS) (0.5 hr.)
- Lec. 53: Multimodal Level of Service (MMLOS) (contd.) (0.5 hr.)
- Lec. 54: Design of multimodal transfer facilities (0.5 hr.)
- Lec. 55: Park & Ride (P&R) Facility Planning (0.5 hr.)

Week 12:

Module 4: Urban Transport & Sustainability

- Lec. 56: An Introduction to Pedestrian Road Safety and associated Risk Factors (0.5 hr.)
- Lec. 57: Road crash estimation and elements of predictive methods (0.5 hr.)
- Lec. 58: Predicting Vehicle-Pedestrian and Vehicle-Bicycle conflicts (0.5 hr.)
- Lec. 59: Environmental Concerns of Urban Transport (0.5 hr.)
- Lec. 60: Sustainable strategies for Urban Transportation (0.5 hr.)