Evaluation of Transportation Systems (20-575)

Pre-requisite:
   (1) Transportation Engineering and Planning
   (2) Transportation Systems Analysis

Course Objectives:
Introduction to certain transportation decision problems and their solution procedures.

Course Titles:
1. Introduction to certain important transportation decision problems
2. Attribute decision making
   2.1. Single Attribute decision-making: Engineering economic decisions (Present Worth, Equivalent Annual Payment, Rate of Return, and Benefit/Cost Methods)
   2.2. Cost-Effectiveness Index methods
   2.3. Multi-attribute decision-making
   2.4. Example: Low volume road decisions
3. Road network design problem (Conventional)
   3.1. Introduction, objective function, user/system equilibrium flow, Braess's Paradox
   3.2. Linear Programming methods
   3.3. Implicit enumeration techniques
   3.4. Simplifying and heuristic methods (linear obj. function, decomposition)
   3.5. Meta-heuristic algorithms (Genetic, Simulated Annealing, Ant system, and Hybrid Methods)
4. Road Network Design Problem (Reliability)
   4.1. Design for infrequent-long term effect events (Earthquakes)
   4.2. Design for frequent-short term events (traffic accidents)
   4.3. Design for travel time reliability
5. Special Road Network Design
   5.1. Bus Network Design
   5.2. One-Way street Design
6. Air Network Design
   6.1. Basic Air Network Design Rules
   6.2. Long Distance Air Network Design
7. Water Way Network Design

8. Road Network Maintenance Problem
   8.1. Integer Programming
   8.2. Fuzzy Analysis
   8.3. Markovian Decision-Making

9. Decision under Uncertainty
   9.1. Criteria-based decisions
   9.2. Bayesian decision-making

10. Environmental Aspects of Transportation Decision
    10.1. Impact Area
    10.2. Quantification methods