IEMS 489: Transportation Network Design
Fall 2006

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Class Time and Location:	MW 2:00PM - 3:20PM (Tech M228)

Course Description

Subjects covered include the interrelationship between transportation, inventory, and production costs, the design and operation of physical distribution and collection systems, one-to-one, one-to-many, and many-to-many logistics systems, and the role of terminals and transshipments in transportation networks, as well as relevant analysis methodologies. While examples will be drawn mainly from freight transportation, the methods presented are also useful in the analysis of many passenger transportation systems.

Course material focuses on formulating complex transportation design problems, teaching students to translate real-world engineering decisions and constraints into analytic models. The course is encouraged for all students interested in transportation, both in IEMS and civil engineering

Learning Objectives

1. To develop an understanding of practical methods for solving difficult logistics and transportation system design problems;
2. To introduce students to methods for the development and assessment of solution approaches for these problems;
3. To expose students to recent research in transportation network design and continuous approximation; and,
4. To engage students in an in-depth research project.

Prerequisites

Students are expected to have completed some coursework in mathematical programming, large-scale optimization and logistics [at least one of the following: 450, 454, or 480; or consent of the professor]. In addition, students should be familiar with some high level programming language.

Course Materials

Required text:
Logistics Systems Analysis, 4th edition, C.F. Daganzo, Springer-Verlag, 2005.

Course Assessment

1. Problem sets (40%).
2. Paper (40%).
3. Participation (20%).

Students will look at a specific distribution system (for passengers or freight). The problem should be framed in terms of specific questions: e.g., how should one best do something...? What would happen if something was done ....?). Students should meet with the instructor during the second week of class to propose a specific topic, and get some guidance. An interim report should be submitted at the end of week 5 describing: the problem, the pertaining literature, the proposed model and solution approach, the expected results, and the proposed organization for the final report. A detailed discussion with the professor should be scheduled within a week, to review and refine the proposal. The final report is due on the last day of class and students will present their projects. Grading will be based on three factors: the amount of imagination exhibited by the student in selecting the problem, the substance of the work itself, and the quality of the report.

Course outline

Week	*Date*	*Topic*	*Reading*	*Assignment*
Chapters 1 and 2: Introduction; Logistic costs				
1	9/18	Course overview; modeling	1.1	
2	9/25	Logistics costs	2.1-2.5	2.6
Chapter 3: One-to-one distribution				
3	10/2	Introduction/ EOQ; continuous approximation	3.1-3.4	3.2 AND 3.6 OR 3.9
4	10/11	CA method, cont.; Optimization methods	3.5-3.7	
Chapter 4: One-to-many distribution				
5	10/18	VRP; identical customers	4.1-4.4	4.2, 4.5 and 4.6
6	10/25	Implementation; different customers	4.5-4.8	
Chapter 5: One-to-many distribution with transshipment				
7	11/1	One transshipment; extensions	5.1-5.4	5.1 and 5.6
8	11/8	Multiple transshipments;	5.5	
Chapter 6: Many-to-many distribution				
9	11/15	Role of terminals; no transshipment; one terminal	6.1-6.3	6.1 and 6.3
10	11/22	One/multiple transshipments; present projects	6.4-6.5	
	11/27	Final projects		