IE480-1: Production and Logistics -1
Winter 2010

Instructor: Karen Smilowitz
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Class Time and Location: MW 9:00-10:20 (Tech M228)

Course Description

This course will provide an introduction to modeling and solution methods for facility location, transportation and inventory management decisions.

Learning Objectives

By the end of the quarter, you should learn

1. To model and formulate a variety of logistics problems;
2. To develop and assess solution methods for these problems; and,
3. To use these tools to analyze strategic, tactical, and operational supply-chain decisions including facility location, vehicle routing, and inventory management.

Course outline

Week	*Date*	*Topic*	*Related readings*
1	1/4	Overview of production and logistics; Assessing problem complexity	LOL 1; ICO I.5; LLRC 3; NDL 3; NF B.1
2	1/11	Facility location: Covering models; greedy heuristics; branch and bound; Lagrangian relaxation	NDL 1,4; NF 16; IOC II.3, II.4
3	1/18	Median models; **No class on 1/18** Improvement heuristics	LOL 12; NDL 5-6
4	1/25	Fixed charge models: weak and strong formulations; fractional cutting plane approach; model extensions	ICO II.5; NDL 7-8
5	2/1	Transportation: TSP formulation and solution procedures; heuristics (construction and improvement) for the TSP	LLRS 2,5; LOL 3; ICO II.6
6	2/8	Heuristics and exact algorithms for the VRP; Set covering approaches with column generation	LLRS 12; LOL 13, 14 LOL 16
7	2/15	Variants of the VRP	
	2/17	MIDTERM	
8	2/22	Deterministic inventory models: EOQ and model relaxations; Wagner Whitin	LOL 6, 7
9	3/1	Stochastic inventory models: single period (newsvendor); multi-period models	LOL 8
10	3/8	Stochastic inventory: multi-period models, risk pooling	
	3/17	FINAL EXAM: 9-11 am	

Prerequisites

IEMS 450-1 is a prerequisite for this class. In addition, students should be familiar with some high level programming language.

Course Materials

The course notes draw material from a variety of texts:
[NDL] Daskin, M. S., 1995, Network and Discrete Location: Models, Algorithms and Applications, John Wiley and Sons, Inc., New York.
[LOL] Simchi-Levi, D.S., X. Chen, and J. Bramel, 2005, The Logic of Logistics, Springer Verlag, New York.
[ICO] Nemhauser, G. L. and L. A. Wolsey, 1988, Integer and Combinatorial Optimization, John Wiley, NY.
[LLRS] Lawler, E. L., J. K. Lenstra, A. H. G. Rinnooy Kan, and D. B. Shmoys, 1985, The Traveling Salesman Problem: A Guided Tour of Combinatorial Optimization, John Wiley and Sons, New York.
[NF] Ahuja, R. K., T. L. Magnanti and J. B. Orlin, 1993, Network Flows: Theory, Algorithms and Applications, Prentice Hall, Englewood Cliffs, NJ.

Other reference texts:
Francis, R. L., L. F. McGinnis, Jr. and J. A. White, 1992, Facility Layout and Location: An Analytical Approach, Prentice Hall, Englewood Cliffs, NJ.
Golden, B. L. and A. A. Assad (eds.), 1988, Vehicle Routing: Methods and Studies, North Holland, Amsterdam.
Mirchandani, P. B., and R. L. Francis, 1990, Discrete Location Theory, John Wiley and Sons, Inc., New York.
Nahmias, S., 1997, Production and Operations Management, Third Edition, Irwin, Chicago.

Course Assessment

There will be approximately 5 problem sets, a midterm and a final exam.

1. Problem sets (25%).
2. Midterm exam (30%).
3. Final exam (40%).
4. Participation (5%). Students are expected to prepare for and actively participate in class discussions.

Homework Policy

A due date will be specified on each assignment. Late assignments will not be accepted, except in the most extraordinary circumstances and then only with my prior permission.

Homework assignments are NOT group projects. In some cases, you may ask your peers for help, in which case you must acknowledge this help in your assignment, "I thank XXX for helping me solve this problem." Failure to follow this model will result in a loss of credit for the assignment.