IEMS 482: Routing and Scheduling
Fall 2012

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Office Hours:	M 3–4, F 2–3, and by appointment.
	Location: Tech M233
Class Time and Location:	TuTh 2:00PM - 3:20PM (Tech LG76)

Course Description

This course provides an introduction to modeling and solution methods for vehicle routing and scheduling problems. While examples are drawn mainly from vehicle routing applications, the methods presented are also useful in the analysis of other routing and scheduling problems. The course is encouraged for students interested in transportation, across many departments.

In Fall 2012, the course will focus on the development of a repository of vehicle routing software to be housed at Northwestern, available to Northwestern students and others outside the university. In the first third of the quarter, we will be researching currently available vehicle routing software, and then in the remainder of the course, we will begin development of the Northwestern repository. The course will also review existing modeling, formulation, and solution approaches to routing and scheduling problems which will be incorporated into the repository resources. While students will be responsible for components of the repository (researching available source code and developing new code), the class will work as a team to develop the repository.

Learning Objectives

1. To introduce students to modeling and formulation techniques for a variety of routing and scheduling 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 routing and scheduling problems; and,
4. To engage students in the development of a source code repository that can be used by students engaged in routing and scheduling research.

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

Recommended text: Paolo Toth and Daniele Vigo (2002), "The Vehicle Routing Problem", SIAM Discrete Mathematics and Applications 9.
Available online: www.siam.org - join as a student and receive the member price.

Other reference texts include:

1. Ahuja, R. K., T. L. Magnanti and J. B. Orlin (1993); *Network Flows: Theory, Algorithms and Applications*; Prentice Hall.

2. Ball, M.O., Magnanti, T.L., Monma, C.L., Nemhauser, G.L., eds. (1995); *Network Routing. Handbooks on Operations Research and Management Science*; Elsevier.

3. Golden, B. L., S. Raghavan, and E. Wasil, eds., (2008); *The Vehicle Routing Problem: Latest Advances and New Challenges*; Series: Operations Research/Computer Science Interfaces Series , Vol. 43.

4. 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 & Sons, Ltd.

5. Laporte G., Gendreau M., Potvin J-Y, Semet F. (2000); *Classical and modern heuristics for the vehicle routing problem*; International Transactions in Operational Research, Volume 7, Numbers 4-5, pp. 285-300(16).

6. Gendreau, M. and J-Y Potvin (2010); *Handbook of Metaheuristics*, available on-line from NUCAT.

Related journals include: Operations Research, Management Science, Transportation Science, Transportation Research, IIE Transactions, Interfaces (for applications), Naval Research Logistics.
Online bibliography at http://www.sintef.no/static/am/opti/projects/top/vrp/bibliography.html