



OIM 413 – Logistics and Transportation Fall 2016

Class Time: Tuesdays and Thursdays: 10:00-11:15AM
Classroom: ISOM Room 120

Instructor: Dr. Anna Nagurney
John F. Smith Memorial Professor of Operations Management

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Office Hours: Tuesdays: 12:00AM-1:30PM; Thursdays: 11:30-1:00PM,
and by appointment

Teaching Assistant: Deniz Besik: dbesik@som.umass.edu

Office Hours: Wednesdays: 3-5PM, ISOM Room G11

Course Description:

The growing complexity and scale of problems facing managers in the present world environment has led to the increasing importance of the role of operations management. A major area in which sophisticated operations management techniques have had wide success and application is transportation and logistics. The timely distribution of goods and services from producers to consumers, and a well-designed associated transportation network are essential to the success of any enterprise.

In this course, we will focus on the development of network models and algorithms for problems in transportation and logistics. The course covers some of the fundamental methodologies and analytical tools. The course consists of lectures, focusing on congested urban transportation systems, since they tend to be the most complex. The tools provided will also enable the analysis of many freight and airline network problems as well. Throughout the course, analogies and connections to logistics are made as well as to supply chains. In addition, highlights of and relationships to other network systems such as the Internet and electric power generation and distribution networks as well as economic and financial networks are also established and discussed.

This course integrates current events in transportation and logistics as they occur throughout the semester to illustrate the direct applicability of the tools covered in class. Additional resources and relevant materials are available on the Virtual Center for Supernetworks website: see <http://supernet.isenberg.umass.edu/>

This syllabus and Professor Nagurney's class lecture notes are available online at: <http://supernet.isenberg.umass.edu/courses/OIM413-Fall2016.html>

Outline of Course Topics

- The transportation planning process
- Representation of transportation problems on networks through nodes, links, origin/destination pairs, demands, costs, path flows, and link flows
- Concepts of optimization, competition, and equilibrium on a network: user-optimization versus system-optimization
- The standard transportation network model (user-optimized and system-optimized versions) with fixed travel demands
- Exact equilibration algorithms (both user-optimized and system-optimized versions) for the solution of simple network problems with disjoint paths and with linear user cost functions
- Equilibration algorithms for the solution of general transportation network problems, either user-optimized or system-optimized, and with linear user cost functions
- Sensitivity analysis and the Braess paradox
- Policy interventions - toll patterns – link tolls and path tolls
- Extensions of user-optimized transportation network models:
 - the elastic demand model
 - the extended model
 - the multiclass/multimodal model

We will emphasize qualitative analysis for these models as well as their relationships to the fixed demand standard model.

- An introduction to logistics on a network

We will discuss how transportation models can also be used in logistics decision-making.

- **Spatial price equilibrium problems and supply chains**

Copies of the course lecture materials along with additional supporting handouts and articles will be distributed in class. These serve as the text for the course.

Two classic books on transportation, "Studies in the Economics of Transportation," by Beckmann, McGuire, and Winsten and "Urban Transportation Networks," by Sheffi are available at:

<http://supernet.isenberg.umass.edu/classics.htm>

Guest Lectures

In addition, we will have field trips. These will take place during class time and the dates will be announced in class.

Requirements

There will be regular homework assignments given out in class that will be graded and returned.

There will be two exams and a paper, done individually and independently. The required paper should be 7 pages minimum and 10 pages maximum, not including references. The topic should be a problem in transportation/logistics that you are personally very interested in. You must relate it to the course materials and demonstrate possible solutions. The paper is due on the last day of class. More information will be provided by Professor Nagurney in class.

Students must attend the classes. If a student cannot attend a class, please notify Professor Nagurney via email or by phone before class.

Students must adhere to the University of Massachusetts Amherst policy on academic honesty and complete all the assignments and exams independently.

Grading

Homework:	30%
Exam #1:	25%
Paper:	20%
Exam #2:	25%

Important Notes

Each student can bring a single 8.5X11 piece of paper with notes written on both sides to each exam. No other material can be used during the exams.

Background/Prerequisite

It is required that the student has successfully completed a course such as OIM 310, Manufacturing and Service Operations Methods, or an equivalent course. If your preparation is in question, please see Professor Nagurney.
