



FOMgT 341 - Transportation and Logistics Fall 2009

Class Time: Mondays and Wednesdays: 8:40-9:55
Classroom: ISOM Room 125

Instructor: Dr. Anna Nagurney
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Office Hours: Mondays: 10:30-11:30; Wednesdays: 10:00-11:00,
and by appointment

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Office Hours:	Tuesdays: 4:00-6:00	Mondays: 3:00-5:00PM
	and by appointment	
Office:	ISOM Room G28	ISOM Room G28

Course Description:

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

In this course we will focus on the development of models and algorithms for problems in transportation and logistics. The first part of the course will lay down the foundation for the methodologies and will consist of lectures on networks and transportation, 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. The second part of the course will emphasize problems and models in logistics with an emphasis on interregional and international

trade issues in the context of spatial price equilibrium problems. Connections to supply chain networks and other network systems such as the Internet and electric power generation and distribution networks as well as economic and financial networks will also be established.

This course integrates current events in transportation as they occur throughout the semester to illustrate the direct applicability of the tools covered in class. Additional resources and relevant materials as well as examples of some previous FOMGT 341 class project presentations are available on the Virtual Center for Supernetworks website: see <http://supernet.som.umass.edu>

Outline of Course Topics

- 1. The transportation planning process**
 - 2. Representation on networks**
 - 3. Concepts of competition and equilibrium on a network
user-optimization versus system-optimization**
 - 4. The standard model**
 - 5. Exact equilibration for the solution of simple network problems with
disjoint paths and with linear user cost functions**
 - 6. Equilibration algorithms for the solution of general network problems,
either user-optimized or system-optimized, and with linear user cost
functions**
 - 7. Sensitivity analysis and the Braess paradox**
 - 8. Policy interventions - toll patterns**
 - 9. Extensions of user optimized or equilibrium models -
the elastic demand model
the extended model
the multiclass/multimodal model**
 - 10. An introduction to logistics on a network**
 - 11. Spatial price equilibrium problems and supply chains**
 - 12. Extensions of spatial price equilibrium problems**
 - 13. Policy interventions - price supports, tariffs, etc.**
- Copies of the course lecture materials along with additional supporting**

handouts and articles will be distributed in class. Together these serve as the text for the course. The class lectures are available online at: <http://supernet.som.umass.edu/courses/FOMgT341-Fall2009.html>

Each set of lecture notes contain additional references and sources.

Two classic books on transportation, *Studies in the Economics of Transportation* by Beckmann, McGuire, and Winsten and *Urban Transportation Networks* by Sheffi, are available online and can be downloaded. Links to these books can be found at: <http://supernet.som.umass.edu/classics.htm>

Requirements

There will be regular homework assignments given out in class that will be graded and returned. In addition, there will be two exams and a group class project, consisting of a paper and class presentation, to be discussed further in class. The students are required to attend the classes. If a student cannot attend class, please notify Professor Nagurney via email or by phone.

Grading

Homework:	25%
Exam #1:	25%
Group project and presentation:	25%
Exam #2:	25%

Background: It is required that the student has successfully completed FOMGT 353, Introduction to Management Science, or an equivalent course. If your preparation is in question, please see Professor Nagurney.

The UMass Amherst INFORMS Student Chapter organizes a lecture series each semester. Some of the presentations in the Fall 2009 are of relevance to this course. Students in the course are encouraged to attend these lectures. These seminars take place on prescheduled Fridays. Information on the speakers and their presentations are available of this link: <http://supernet.som.umass.edu/informs/speakernew.html>