OIM 413 – Logistics and Transportation
Fall 2018

Class Time: Tuesdays and Thursdays: 10:00-11:15AM
Classroom: ISOM Room 126

Instructor: Dr. Anna Nagurney
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Office Hours: Tuesdays: 12:00AM-1:30PM; Thursdays: 12:00-1:00PM,
                and by appointment

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Office Hours: Wednesdays: 1:30-3:30PM, 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-Fall2018.html

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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 are now available online. "Studies in the Economics of Transportation," by Beckmann, McGuire, and Winsten is available at: http://supernet.isenberg.umass.edu/classics.htm and "Urban Transportation Networks," by Sheffi is available at: https://sheffi.mit.edu/sites/sheffi.mit.edu/files/sheffi_urban_trans_networks_0.pdf

Guest Lectures

In addition, we may have field trips, if time permits. 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 5 pages, not including references. The topic should be a problem in transportation/logistics that you are personally very interested in and that you believe can be improved/fixed. The paper is due no later than 12/6/2018. 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:	**25%**
Exam #1:	**25%**
Paper:	**15%**
Class Participation:	**10%**
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.

Please Note:The University of Massachusetts Amherst is committed to making reasonable, effective and appropriate accommodations to meet the needs of students with disabilities and help create a barrier-free campus. If you have a disability and require accommodations, please register with Disability Services (161 Whitmore Administration building; phone 413-545-0892) to have an accommodation letter sent to your faculty. Information on services and materials for registering are also available on their website