SOM 825 – Management Science Seminar: Real-World Applications – Advances in Variational Inequality Models for Supply Chains

Spring 2019

Class Time: Tuesdays: 1:00-3:45PM (Time may be moved earlier to accommodate students.)

Classroom: ISOM Room 306

Instructor: Dr. Anna Nagurney
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Office Hours: Tuesdays: 10:30-11:30AM; Thursdays: 11:00AM-noon, and by appointment

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Course Description:

This course is a seminar course that focuses on an in-depth study of the scientific literature tackling challenging Operations Research / Management Science multi-decision-maker problems, often in a game theoretic context, drawn from the real-world and with a specific focus on supply chains, both profit-based ones and those in disaster relief.

An essential part of this seminar is the reading and discussion of primary scientific literature sources in the form of journal articles. Of specific focus of this year's seminar is multistage stochastic variational inequalities.

Since this seminar is an advanced one, in order to push the frontiers of research, students should be comfortable with much of the material in the following books, which are background resources:

***Network Economics: A Variational Inequality Approach*, second and revised**

edition, 1999, Anna Nagurney, Kluwer Academic Publishers, Boston, Massachusetts,

***Projected Dynamical Systems and Variational Inequalities with Applications*, 1996, Anna Nagurney and Ding Zhang, Kluwer Academic Publishers, Boston, Massachusetts.**

Additional related books on supply chains, with profit-based ones, are:

***Supply Chain Network Economics: Dynamics of Prices, Flows, and Profits*, 2006, Anna Nagurney, Edward Elgar Publishing, Cheltenham, England,**

***Competing on Supply Chain Quality: A Network Economics Perspective*, 2016. Anna Nagurney and Dong Li, Springer International Publishing Switzerland,**

and disaster-based ones:

***Dynamics of Disasters: Key Concepts, Models, Algorithms, and Insights*, 2016, I.S. Kotsireas, A. Nagurney, and P.M. Pardalos, Editors, Springer International Publishing Switzerland,**

***Dynamics of Disasters: Algorithmic Approaches and Applications*, 2018, I.S. Kotsireas, A. Nagurney, and P.M. Pardalos, Editors, Springer International Publishing Switzerland.**

The above books will be made available on a need basis.

Scientific Literature that Will be Read, Discussed, and Presented by Seminar Participants

Tariffs and Quotas in World Trade: A Unified Variational Inequality Framework, Anna Nagurney, Deniz Besik, and June Dong, in press in the *European Journal of Operational Research.*

Global Supply Chain Networks and Tariff Rate Quotas: Equilibrium Analysis with Application to Agricultural Products, Anna Nagurney, Deniz Besik, and Ladimer S. Nagurney, Isenberg School of Management, UMass Amherst, preprint.

How to Increase the Impact of Disaster Relief: A Study of Transportation Rates, Framework Agreements and Product Distribution, Timo Gossler, Tina Wakolbinger, Anna Nagurney, and Patrizia Daniele, *European Journal of Operational Research* 274(1): (2019), pp 126-141.

A Variational Equilibrium Network Framework for Humanitarian Organizations in Disaster Relief: Effective Product Delivery Under Competition for Financial Funds, Anna Nagurney, Patrizia Daniele, Emilio Alvarez Flores, Valeria Caruso, in *Dynamics of Disasters: Algorithmic*

***Approaches and Applications*, Ilias S. Kotsireas, Anna Nagurney, and Panos M. Pardalos, Editors, Springer International Publishers Switzerland, 2018, pp. 109-133.**

An Integrated Financial and Logistical Game Theory Model for Humanitarian Organizations with Purchasing Costs, Multiple Freight Service Providers, and Budget, Capacity, and Demand Constraints, Anna Nagurney, Mojtaba Salarpour, and Patrizia Daniele, Isenberg School of Management, UMass Amherst, preprint.

A Bi-Criteria Indicator to Assess Supply Chain Network Performance for Critical Needs Under Capacity and Demand Disruption, Qiang Qiang and Anna Nagurney, *Transportation Research A* 46(5): (2012) pp 801-812.

Supply Chain Networks with Global Outsourcing and Quick-Response Production Under Demand and Cost Uncertainty, Zugang Liu and Anna Nagurney, *Annals of Operations Research* 208(1): (2013) pp 251-289.

Supply Chain Network Equilibrium with Strategic Financial Hedging Using Futures, Zugang Liu and Jia Wang, *European Journal of Operational Research* 272(3): (2019) pp 962-978.

Supply Chain Network Equilibrium with Strategic Supplier Investment: A Real Options Perspective, Zugang Liu and Jia Wang, *International Journal of Production Economics* 208: (2019) pp 184-198.

Requirements

In addition, there will be a research project, consisting of a paper and class presentation. The students are required to attend the classes. If a student cannot attend class, please notify Professor Nagurney via email or by phone prior to the class absence.

Grading

Seminar participation:	**20%**
Seminar presentations (3-4):	**40%**
Research project and presentation:	**40%**