SCH-MGMT 597LG: Humanitarian Logistics and Healthcare

Spring 2018

Class Time: Tuesdays and Thursdays: 8:30-9:45AM
Classroom: ISOM Room 122

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:

The number of disasters is growing, as well as the number of people affected by them. Logistics plays a central role in all phases of disaster management and supporting humanitarian operations. The fundamental task of a logistics system is to deliver the appropriate supplies, in quality condition, in the right amounts, to the locations at the time that they are needed. However, due to the inherent nature of disasters, humanitarian logistics is faced with unique challenges: the critical infrastructure, including the transportation and communication systems, may have been severely negatively impacted and their functionality compromised; there is a short time window in which to respond with the critical needs products, which must be delivered in order to prevent loss of life and human suffering, and there may be great uncertainty due to the disruptions, among other complications.

This course covers the unique challenges and prospective solutions associated with humanitarian logistics in emergency mitigation and preparedness, disaster response, and recovery. The course overviews the

similarities and the differences between commercial supply chains and humanitarian relief chains, introduces performance metrics, and provides tools for the analysis and design of supply chains for humanitarian critical needs products, as well as for the coordination and teaming of humanitarian organizations. It also covers such major issues as risk management, which is also relevant for business continuity, material convergence, and competition for financial funds for disasters. The course overviews recent complex crises as well as other major ones such as Hurricanes Katrina, Harvey, and Maria, the Haiti earthquake, and the Ebola crisis in western Africa.

Guest speakers, who are experts in emergency preparedness, humanitarian healthcare, and advanced communications, will provide additional in-depth knowledge and practitioner-based experiences to support the lectures, primary source reading materials, including journal articles, case studies, newspaper articles, and videos in the course.

Required reading materials are given below following the Outline of Course Topics.

Outline of Course Topics

- **Defining logistics and humanitarian logistics**
- **What is a disaster – examples and impacts and who are the stakeholders**
- **Commercial versus humanitarian supply chains: similarities and differences**
- **Disaster management cycle phases**
  **** mitigation and preparedness**
  **** response**
  **** recovery**
- **Fundamental issues and questions in humanitarian logistics assessment**
- **Nonlinear network optimization models for humanitarian operations**
  **** system-optimization versus user-optimization**
- **Risk management and vulnerability analysis**
- **Network performance metrics**
  **** transportation and critical infrastructure**
  **** supply chains**
- **The design of critical needs product supply chains**

- **Humanitarian organization coordination and teaming**

- **The role of communications in disaster operations**

- **Humanitarian healthcare supply chains and product perishability**
  **** blood supply chains**
  **** pharmaceutical supply chains**

- **Game theory and financial funding in humanitarian operations**

Copies of the course lecture materials along with additional supporting handouts and articles that are not available online will be distributed in class.

Each set of lecture notes contains references and sources and can be accessed at:
http://supernet.isenberg.umass.edu/courses/SCH-MGMT597LG-Spring2018.html

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Requirements

The Required Reading List

Professor Anna Nagurney will assign the readings below to complement the lectures. Students will be notified in class as to which week the readings should be done. The below list is in the chronological order of reading assignments. Any papers that are not easily accessible will be provided.

1. D. Wilson, 2016. Ode to the humanitarian logistician: Humanistic logistic through a nurse's eye. In: Dynamics of Disasters: Key Concepts, Models, Algorithms, and Insights, I. Kotsireas, A. Nagurney, and P.M. Pardalos, Editors, Springer International Publishing Switzerland, pp. 361-369.

2. A. S. Thomas and L. R. Kopczak, 2005. From logistics to supply chain management: the path forward in the humanitarian sector. Fritz Institute Report; available at:
http://www.fritzinstitute.org/PDFs/WhitePaper/FromLogisticsto.pdf

3. L. N. Van Wassenhove, 2006. Blackett Memorial Lecture: Humanitarian aid logistics: supply chain management in high gear, Journal of the Operational Research Society 57, 475-489; available at:
http://bit.ly/2iWGbbh

4. A. Cozzolino, 2012. Humanitarian logistics and supply chain management, chapter in Humanitarian Logistics, Springer, New York; available at:
http://bit.ly/1zTvnuZ

5. Y. Sheffi, 2015. Preparing for disruptions through early detection, MIT

Sloan Review, Fall, 31-42; available at:
https://sloanreview.mit.edu/article/preparing-for-disruptions-through-early-detection/

6. A. Nagurney and Q. Qiang, 2012. Fragile networks: Identifying vulnerabilities and synergies in an uncertain world, International Transactions in Operational Research 19, 123-160; available at:
https://supernet.isenberg.umass.edu/articles/NagurneyFragileNetworksITOR.pdf

7. B.M. Beamon and B. Balcik, 2008. Performance measurement in humanitarian relief chains, International Journal of Public Sector Management 21, 4-25; available at:
https://catalyst.uw.edu/workspace/file/download/e0d1e5bb77c3e74d287fc8d7680a717972e40f39d1f8f13887ebbf3b5b035e33

8. R. McLachlin and P.D. Larson, 2011. Building humanitarian supply chain relationships: lessons from leading practitioners; available at:
https://www.researchgate.net/publication/235273857_Building_Humanitarian_Supply_Chain_Relationships_Lessons_From_Leading_Practitioners

9. B. Balcik, B.M. Beamon, C.C. Krejci, K.M. Muramatsu, and M. Ramirez, 2010. Coordination in humanitarian relief chains: Practices, challenges and opportunities, International Journal of Production Economics 126, 22-34; available at:
https://catalyst.uw.edu/workspace/file/download/e0d1e5bb77c3e74d287fc8d7680a7179f2838d3037a1327b17211961958118c1

10. A. Nagurney, A.H. Masoumi, and M. Yu, 2015. An integrated disaster relief supply chain network model with time targets and demand uncertainty, in Regional Science Matters: Studies Dedicated to Walter Isard, P. Nijkamp, A. Rose, and K. Kourtit, Editors, Springer International Publishing Switzerland (2015), pp. 287-318. available at:
http://supernet.isenberg.umass.edu/articles/Disaster-Relief-Integrated-Goal-Programming-Supply-Chain-Network-Model.pdf

11. A. Nagurney, A.H. Masoumi, and M. Yu, 2012. Supply chain network operations management of a blood banking system, Computational Management Science, 9(2), 205-231; available at:
http://supernet.isenberg.umass.edu/articles/BloodSupplyChains.pdf

12. A.H. Masoumi, M. Yu, and A. Nagurney, 2012. A supply chain generalized network oligopoly model for pharmaceuticals under brand differentiation and perishability, Transportation Research E 48, 762-780; available at:
http://supernet.isenberg.umass.edu/articles/Pharmaceutical_Supply_Chain_Network_Oligopoly.pdf

13. A. Nagurney, M. Yu, and Q. Qiang, 2011. Supply chain network design for critical needs with outsourcing, Papers in Regional Science 90, 123-142; available at:
http://supernet.isenberg.umass.edu/articles/CriticalNeedsSupplyChainNetworkDesign.pdf

14. A. Nagurney, E. Alvarez Flores, and C. Soylu, 2016. A Generalized Nash Equilibrium network model for post-disaster humanitarian relief,

Transportation Research E 95, 1-18; available at:
https://supernet.isenberg.umass.edu/articles/Generalized_Nash_Equilibrium_for_Disaster_Relief.pdf

Additional Readings and Resources

There are additional papers as well as presentations posted on the Humanitarian Logistics: Networks for Africa website, which was designed by Professor Anna Nagurney to serve as a repository for information gathered at the Rockefeller Foundation sponsored workshop that she organized and that took place at the Bellagio Center on Lake Como, Italy. The materials are available at:
https://supernet.isenberg.umass.edu/hlogistics/hlogistics.html

Also, a podcast of an interview with Professor Nagurney on Sustaining the Supply Chain, courtesy of the AMS and Mr. Michael Breen is available at:
http://www.ams.org/samplings/mathmoments/mm90-relief-podcast

There will be regular written homework assignments given out in class that will be graded and returned. In addition, there will be one exam, 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 prior to the class absence.

Grading

Class participation:	**10%**
Homework:	**30%**
Preliminary group project presentation:	**10%**
Exam (midterm):	**25%**
Final group project presentation and paper:	**25%**

Background: The student should demonstrate interest in the fundamentals of logistics and be comfortable with basic modeling and analytics. 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