



SCH-MGMT 597LG: Humanitarian Logistics and Healthcare

Spring 2015

Class Time: Mondays and Wednesdays: 10:00-11:15AM
Classroom: ISOM Room 122

Instructor: Dr. Anna Nagurney
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Office Hours: Mondays: 11:30AM-12:30PM; Wednesdays: 12:00-1:30PM,
and by appointment

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 material convergence and earmarked financial funds for disasters. It discusses recent complex crises such as the Ebola healthcare 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 – recent 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 communication in disaster operations
- Humanitarian healthcare supply chains and product perishability
 - ** blood supply chains
 - ** pharmaceutical supply chains
- Material convergence 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.

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. 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>

2. A. Thomas and M. Mizushima, 2005. Logistics training: necessity or luxury? *Forced Migration Review*, 60-61; available at:

<http://www.fritzinstitute.org/PDFs/FMR18/FMR22fritz.pdf>

3. Benita Beamon, 2004. Humanitarian relief chains, issues and challenges, *Proceedings of the 34th International Conference on Computers & Industrial Engineering*, pp. 77-82; available at:

<http://www.docstoc.com/docs/31881727/HUMANITARIAN-RELIEF-CHAINS>

4. 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/1wpC8nf>

5. L. Van Wassenhove and A. J. Pedraza Martinez, 2012. Using OR to adapt supply chain management best practices to humanitarian logistics, *International Transactions in Operational Research* 19, 307-322; available at:

<http://onlinelibrary.wiley.com/doi/10.1111/j.1475-3995.2011.00792.x/full>

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

7. 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: <http://onlinelibrary.wiley.com/doi/10.1111/j.1475-3995.2010.00785.x/full>

8. 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>

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, 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>

11. 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>

12. Q. Qiang and A. Nagurney, 2012. A bi-criteria indicator to assess supply chain network performance for critical needs under capacity and demand disruptions, *Transportation Research A*, 46(5), 801-812; available at: <http://supernet.isenberg.umass.edu/articles/bicriteria.pdf>

13. A. Nagurney, A. H. Masoumi, and M. Yu, 2011. 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>

14. 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

15. F. Toyasaki and T. Wakolbinger, 2011. Impacts of earmarked private donations for disaster fundraising, *Annals of Operations Research*, December, 1-21.

16. L. Destro and J. Holguin-Veras, 2010. Estimating material convergence: Flow of donations for Hurricane Katrina, RPI; available at:
<http://assets.conferencespot.org/fileserver/file/30065/filename/12kose.pdf>

17. N. Altay and W. G. Green III, 2006. OR/MS research in disaster operations management, *European Journal of Operational Research*, 175, 475-494, available at:
<http://www.parvac.washington.edu/courses/inde599/readings/AltayandGreen.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:
<http://hlogistics.isenberg.umass.edu/>

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, two individual short projects, consisting only of class presentations, 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:	25%
Individual class presentations:	15%
Group project and presentation:	25%
Exam (midterm):	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.