

Supply Chain Modeling and Algorithms
26:799:660 Spring 2018

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 or by appointment

Class Website Blackboard

Class Timing Wednesday 10:00 AM - 12:50 PM

Location 1WP 358

Course Description

This course focuses on the application of operations research and management science techniques to model and solve the newest emerging supply chain management problems (such as supply chain disruption problems, integrated supply chain design problems, container vessel planning problems, emergency logistic problems, and supply chain contract design) to meet the changing needs of new generations of SCM Ph.D. students. The course also emphasizes the design of search algorithms and the analysis of computational performance to effectively solve practical business decision and optimization problems.

Text

There is no required textbook for the course. Selected academic journal articles to be discussed in classes are listed in Appendix. All these papers are free for Rutgers students via the link from Rutgers library. Some class notes will be gradually posted on Blackboard, under the “Course Documents” folder.

Grading

Class presentation and participation:	40%
Midterm:	30%
Final Exam:	30%

Make-up Exam Policy

There will be no make-up exams unless you have a serious reason, and, in such cases, you **must** notify the instructor **5 days** before the exams.

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Tentative Schedule

Date	Topic
1/17	Syllabus and Course Introduction Supply Chain Management Problems: Concepts, Literature Review, Trend, Methods and Algorithms A Small-scale Supply Chain Competition Problem: Model and Analysis
1/24	A Small-scale Supply Chain Competition Problem: Model and Analysis Continued) Facility Location Problem Branch-Bound Algorithm
1/31	Supply Chain Disruption Problem Integrated Supply Chain Design Problem Lagrangian Relaxation
2/7	Integrated Production and Distribution Scheduling Problem Network Flow Modeling Heuristic 1
2/14	Error Bound and Worst Case Analysis
2/21	Container Vessel Scheduling Problem Heuristic 2
2/28	Exam 1
3/7	Emergency Logistic Heuristics 3
3/14	No Class (Spring Recess)
3/21	Supply Chain Contract and Information Sharing
3/28	Supply Chain/Marketing/Economics Interface Problem
4/4	Presentation 1
4/11	Presentation 2
4/18	Exam 2
4/25	Class Wrap-up and Discussions

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Appendix: Course Materials

Lecture Materials

1. L. Qi, J. Shi, and X. Xu (2015). "Supplier Competition and its Impact on Firm's Sourcing Strategy". *Omega, the International Journal of Management Science*, 55, 91-110.
2. M.A. Efraymson and T.L. Ray (1966). "A Branch-Bound Algorithm for Plant Location". *Operations Research*, 14, 361-368.
3. L. Qi, Z.M. Shen, and L. Snyder (2009). "A Continuous-Review Inventory Model with Disruptions at Both Supplier and Retailer". *Production and Operations Management*, 18, 516-532.
4. L. Qi, Z.M. Shen, and L. Snyder (2010). "The Effect of Supply Uncertainty on Supply Chain Design Decisions". *Transportation Science*, 44, 274-289.
5. S. Gao, L. Qi, and L. Lei (2015). "Integrated Batch Production and Distribution Scheduling with Limited Vehicle Capacity". *International Journal of Production Economics*, 160, 13-25.
6. L. Qi and Z.M. Shen (2010). "Worst-case Analysis of Demand Point Aggregation for the Euclidean p -median Problem". *European Journal of Operational Research*, 202, 434-443.
7. Z. Chen, L. Lei, and H. Zhong (2007). "Container Vessel Scheduling with Bi-directional Flows". *Operations Research Letters*, 35, 186-194.
8. L. Lei, M. Pinedo, L. Qi, S. Wang, and J. Yang (2015). "Personnel Scheduling and Supplies Provisioning in Emergency Relief Operations". *Annals of Operations Research*, 235, 487-515.
9. A.Y. Ha and S. Tong (2008). "Contracting and Information Sharing under Supply Chain Competition". *Management Science*, 54, 701-715.
10. L. Qi, L.Y. Chu, and R. Chen (2016). "Quality Provision with Heterogeneous Consumer Reservation Utilities". *Production and Operations Management*, 25, 883-901.

Presentation Materials

11. G. Cachon and M. Lariviere (2005). "Supply chain coordination with revenue sharing contracts". *Management Science*, 51, 30-44.
12. M. Christiansen, K. Fagerholt, and D. Ronen (2004). "Ship Routing and Scheduling: Status and Perspective". *Transportation Science*, 38, 1-18.

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13. L. Lei, S. Liu, A. Ruszczynski, and S. Park (2006). "On the Integrated Production, Inventory, and Distribution Routing Problem". *IIE Transactions*, 38, 955-970.
14. C. Revelle and G. Laporte (1996). "The Plant Location Problem: New Models and Research Prospects". *Operations Research*, 44, 864-874.
15. Z.M. Shen and L. Qi (2007). "Incorporating Inventory and Routing Costs in Strategic Location Models". *European Journal of Operational Research*, 179, 372-389.
16. B.T. Tomlin (2006). "On the Value of Mitigation and Contingency Strategies for Managing Supply-Chain Disruption Risks". *Management Science*, 52, 639-657.