LOM 6331 Supply Chain Operational Modeling

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Class Time: Monday 6:55 – 9:35
Class Location: Express Scripts Hall 106
Office Hours: Monday, Wednesday 1:00 – 3:00 or by appointment

Course Overview

Supply chains are complex networks integrating suppliers/vendors, manufacturers, distribution centers, retailers and customers, to enable physical entities (raw materials, parts, components, semi-finished and finished products) to be produced and distributed at the right quantities, to the right locations, and at the right time. Effectively managing a supply chain in today’s competitive and globalizing market is a challenging task.

This is a graduate course on modeling decision problems in supply chain management. Both deterministic and stochastic modeling methodologies will be introduced and applied to model tactical/operational level decision problems in supply chain management. These problems arise from a wide range of application areas including production planning and scheduling, transportation and logistics, supplier/vendor selection, supply chain design and configuration, etc.

Deterministic techniques to be introduced include linear programming (LP), mixed-integer linear programming (MILP), network optimization models, and constraint programming (CP). For stochastic models, we will introduce system dynamics using simulation to model the dynamics, randomness and complexity of supply chain systems. Simulation-optimization in hybrid metaheuristic and simulation framework will also be introduced for optimization under uncertainty. Optimization programming language and software packages will be used to implement the optimization models and solution methods.

Course Objectives

1. To provide a detailed coverage how to construct optimization models for a variety of decision problems in supply chain management.

2. To provide hands on experience in the use of state-of-the-art optimization software such as the ILOG OPL Studio for modeling and solving optimization problems.

Course Prerequisites

LOM 6330 Business Logistics Systems
LOM 4350/6350 Management Science (Recommended)
Recommended Reading


Planning and Scheduling in Manufacturing and Services, by M. Pinedo, Springer, 2005.

Term Projects

Two term projects will be assigned: one individual and one group project. For each project, a student needs to submit a proposal, outlining the scope and objectives, for approval before its due date. Project reports will be due at the end of the semester. Detailed instructions on the project will be given in the third week of the class.

The Use of Laptop and Optimization Software

A laptop with preinstalled optimization software will be provided by the Center for Transportation Studies (CTS) to each student. By accepting the laptop, you must agree to the following:

1. Each student must return the laptop with its original condition at the end of the semester. The student is responsible for any loss or damage of the laptop.
2. Please do not use the laptop for internet access to avoid virus damage to the system.

Grading

Class Participation: 10%
Homework Assignment: 10%
Two Projects: 40%
Midterm Exam: 20%
Final Exam: 20%

90 ~ 100 A
80 ~ 90 B
70 ~ 80 C
60 ~ 70 D
Below 60 F
## Tentative Schedule

<table>
<thead>
<tr>
<th>Weeks</th>
<th>Lecture Topics</th>
<th>Notes</th>
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| 1 (Jan 24) | Introduction to LOM 6331  
Math Programming Modeling I  
(HW-1 assigned)                        |                                             |
| 2 (Jan 31)       | Math Programming Modeling II                                                |                                             |
| 3 (Feb 7)     | Math Programming Modeling III:  
Using OPL Studio (HW-2 assigned)  
HW-1due                                      |                                             |
| 3 (Feb 14)       | NETFORM Modeling  
(HW-3 assigned)                                            | HW-2 due                                   |
| 4 (Feb 21)       | Constraint Programming Modeling  
(HW-4 assigned)                                | HW-3 due                                   |
| 5 (Feb 28)       | Production Planning and MRP  
(HW-5 assigned)                                | HW-4 due  
**Individual Project Proposal due** |
| 6 (March 7)     | Project Scheduling  
(HW-6 assigned)                                      | HW-5 due                                   |
| 7 (March 14)     | **Midterm Exam**                                                            |                                             |
| 8 (March 21)     | Supply Chain Configuration  
(HW-7 assigned)                                | HW-6 due                                   |
| 9 (March 28)     | **Spring Break**                                                            | **Group Project Proposal due**            |
| 10 (April 4)    | Shop Scheduling Models  
(HW-8 assigned)                              | HW-7 due                                   |
| 11 (Apr 11)     | TSP & VRP  
(HW-9 assigned)                                | HW-8 due                                   |
| 12 (Apr 18)     | Simulation Optimization using Crystal Ball  
(HW-10 assigned)                             | HW-9 due                                   |
| 13 (Apr 25)     | System Dynamics using Vensim  
(HW-11 assigned)                             | HW-10 due                                  |
| 14 (May 2)      | **Project Presentations**                                                   | HW-11 due  
**Individual Project Paper Due**  
**Group Project Paper Due**          |
| 15 (May 9)      | **Final Exam Week**                                                         |                                             |

Note: This schedule is tentative and we may expect some adjustments.