ISE/MSE 362: Logistics and Supply Chain Management
Spring 2020

Syllabus

Instructor: Prof. Larry Snyder

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Class Hours: Tue and Thu 1:35–2:50 PM, Mohler 451

Office Hours: By appointment

Teaching Assistant: Samira Fallah, saf418@lehigh.edu, Mohler 342, office hours Tue and Thu 10:30–12:00, and by appointment

Course Description: This course examines mathematical and operations research (OR) models for the analysis of supply chains. The course is intended for advanced undergraduates and first-year graduate students who are interested in logistics, supply chain, operations management, and quantitative methods. The course stresses the modeling, analysis, and computational issues associated with supply chain design and operations. Topics include inventory optimization, facility location, demand forecasting, transportation, the bullwhip effect, supply chain coordination, and applications of supply chain theory in other types of systems.

Course Objectives: Upon completion of this course, students will:

1. have developed an understanding of key mathematical and OR models for making decisions about supply chains
2. have enhanced their ability to apply the tools of OR (optimization, simulation, etc.) to supply chains and other systems
3. be able to work with data to describe, make predictions about, and optimize supply chains
4. better understand the relationships between supply chains and other critical systems such as energy and health care
5. feel comfortable using spreadsheets and algebraic modeling software to model and solve problems in supply chains and other fields

Prerequisites: ISE 220 and 251, or ISE 230 and 240, or equivalents; basic knowledge of operations research techniques.

Readings: The textbook for the course is a *draft* of:

- Snyder, L. V., K. Smilowitz, and Z.-J. M. Shen, *Supply Chain Modeling and Optimization*, forthcoming.

You will be provided with PDFs of the draft material; no textbook is required for purchase.

Chapters from the textbook will be assigned as required reading with the material being covered. Lectures will follow the general outline of the book and supplementary materials. The book is best read right after the lecture to reinforce the concepts discussed. The book also provides details that we might not discuss in class. **It is your responsibility to keep up with the reading.**

Please note that the textbook is copyrighted material and **may not be distributed** electronically or on paper without my consent. Also, because this is draft material, please be patient with any errors you find, and please report such errors to me. In fact, I welcome any feedback, positive or negative, or suggestions that you have about the textbook.

You may also wish to consult the following books for reference throughout the course:

- Chopra, S. and P. Meindl, 2012, *Supply Chain Management: Strategy, Planning, and Operation*, 6th ed., Essex, England: Pearson.
- Snyder, L. V. and Z.-J. M. Shen, 2019, *Fundamentals of Supply Chain Theory*, 2nd ed., Hoboken, NJ: John Wiley and Sons.
- Ravindran, A. R. and D. P. Warsing, 2013, *Supply Chain Engineering: Models and Applications*, New York: CRC Press.
- Simchi-Levi, D., P. Kaminski, and E. Simchi-Levi, 2003, *Designing and Managing the Supply Chain: Concepts, Strategies, and Case Studies*, 2nd ed., New York: McGraw-Hill Irwin.
- Silver, E.A., D.F. Pike, and R. Peterson, 1998, *Inventory Management and Production Planning and Scheduling*, 3rd ed., Hoboken, NJ: Wiley.
- Ghiani, G., G. Laporte, and R. Musmanno, 2004, *Introduction to Logistics Systems Management*, 2nd ed., Hoboken, NJ; Wiley.
- Shapiro, A., 2006, *Modeling the Supply Chain*, 2nd ed., South-Western College Pub.
- Nahmias, S. and T. L. Olsen, 2005, *Production and Operations Analysis*, 7th ed., Long Grove, IL: Waveland Press.

Distance Students: For students enrolled in ISE-D10 or MSE-D10, lectures will be made available on CourseSite by the Distance Education office. (In-class students will also have access to the recordings.) Exams must be proctored, following the usual procedures offered by Distance Ed. Homework may be submitted in person or electronically; if you wish to submit it electronically, I prefer that you type your assignments, but photographs or scans of handwritten work are acceptable as well.

Requirements: There will be 4–5 homework assignments, an in-class midterm exam, and an in-class final exam.

1. Homework assignments

   You will be assigned homework every few weeks. The homework problems will be based on the readings and in-class material. They will challenge you to understand, interpret, and extend the models and solution techniques we discuss in class.

2. Mid-term and final exams

   You will be given an in-class midterm exam and an in-class final exam. These exams will test your understanding of the material covered in class.

3. Class participation (in-class students)

   You are expected to attend class regularly, come to class prepared, participate in the discussions we have in class, and ask questions when you are confused.

4. Response essays (distance students)

   In lieu of a class participation requirement, distance students will be required to submit a "response essay" before each Tuesday lecture (starting in week 2). The essay should be roughly 200-400 words (about 2 paragraphs) and should discuss your response to the material covered the previous week. Your essay can include questions that you have about the material, thoughts about how the material might be useful (or not) in your job, summaries of additional reading that you did about the topic, and so on. Please submit the essays electronically on CourseSite.

Your grade will be calculated as follows:

Item	Percentage
Homework assignments	40%
Mid-term exam	20%
Final exam	30%
Class participation (in-class students) or response essays (distance students)	10%

Homework Policy: The homework assignments are likely to take you a fair amount of time, so get started on them early. *No late homework assignments will be accepted unless you clear them with me ahead of time.*

You may work on the homework assignments individually or with a partner. If you work with a partner, you and your partner may submit a single write-up, or you may submit individual write-ups.

You may discuss the homework with students other than your partner, but you must cite any people or sources that helped you on a particular problem. For example: "Smarty McPants and I worked on this problem together" or "I got help from Smarty McPants and consulted 'Service Systems for Dummies' when solving this problem." If you work with a partner but submit individual write-ups, make sure you cite your partner. I also encourage you to come to me or the TA for help when you are stuck.

Remember that you are ultimately responsible for mastering the material on your own, and your performance on the exams will depend on your ability to do so. Therefore, you should make sure you fully understand all of the details of the write-up you submit, whether you submit an individual or joint write-up.

Lecture Format: Class will be primarily lecture-based but I encourage questions, discussions, and other (productive) interruptions. I will sometimes use slides (which I will post on CourseSite) and sometimes use the chalkboard, so please be prepared to take notes.

Software: We will make use of Microsoft Excel or MATLAB for number-crunching. For optimization problems, I will tend to use AMPL or Excel's Solver add-in or in class, but you are welcome to use any modeling environment and solver you wish when you are working on homework problems. These include Excel's Solver, OpenSolver (`opensolver.org`), AMPL, GAMS, Gurobi, or Python/PuLP/Pyomo.

I have requested and received a free license for AMPL for use by students in this course. Instructions for downloading and installing the AMPL software can be found on CourseSite. During the first week of class, I will post an AMPL tutorial video on CourseSite. If you are not already an expert in AMPL (or another modeling environment), I strongly encourage you to watch the video and follow along with AMPL on your own computer.

CourseSite: I will use CourseSite to post slides, lecture notes, homework assignments and their solutions, and other information about the course. Please check there regularly for updates.

Plagiarism Policy: Plagiarism is defined in the Lehigh student handbook as "the unacknowledged appropriation of another's work, words, or ideas in any themes, outlines, papers, reports, or computer programs." This includes "patchwork plagiarism," in which an author essentially quotes another author's work when attempting to paraphrase it. There will be a zero-tolerance approach to plagiarism in this class—plagiarized work will receive a grade of 0. For more information about what plagiarism is and what counts as plagiarism, see `https://libraryguides.lehigh.edu/plagiarism`.

Accommodations for Students with Disabilities: If you have a disability for which you are or may be requesting accommodations, please contact both me and the Office of Academic Support Services, University Center 212 (610-758-4152) as early as possible in the semester. You must have documentation from the Academic Support Services office before accommodations can be granted.

Use of Mobile Devices: The use of cell phones, tablets, laptops, and other electronic devices is prohibited in class. I understand that there may be some legitimate reasons to use such devices in class, but please wait until after class ends to perform these functions. Screens are a distraction both to the students and to the instructor and may not be used.

Tentative Schedule: The following is a **very tentative** outline of the course. I may add, subtract, or rearrange topics as the semester progresses.

Week	Chapter	Topic	Notes
1/20/20	1	Introduction	Thu: No class; watch AMPL tutorial
1/27/20	3	Deterministic Inventory Models	
2/3/20	4	Stochastic Inv. Models: Periodic Review	
2/10/20	5	Stochastic Inv. Models: Continuous Review	
2/17/20	7	Pooling and Flexibility	
2/24/20	2	Forecasting and Demand Modeling	
3/2/20	—	—	Tue: Midterm; Thu: No class
3/9/20	—	—	Spring break
3/16/20	8	Facility Location Models	
3/23/20	10	The Traveling Salesman Problem	
3/30/20	11	The Vehicle Routing Problem	
4/6/20	13	The Bullwhip Effect	
4/13/20	14	Supply Chain Coordination	
4/20/20	16	Applications of Supply Chain Theory	
4/27/20	—	Catch up, wrap up	