ISE 362: Logistics and Supply Chain Management
Fall 2021

Syllabus

Instructor: Prof. Larry Snyder (he/him)

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

Office Hours: By appointment. Please DM me or the TA on Slack to set up a time to meet, in person or by Zoom.

Teaching Assistant: Brandon Augustino (he/him), bra216@lehigh.edu

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

Class Format: This class will meet in person this semester, unless otherwise indicated. Class meetings will consist of a variety of activities, including lectures, discussion, independent assignments,

and small-group work. I will usually use slides but will sometimes use the chalkboard or virtual whiteboard. Slides will be posted on Slack.

I encourage questions, discussions, and other (productive) interruptions during class. This helps you learn—and makes class more fun.

Please follow all COVID-19 guidelines and requirements, including face masks, hand washing, and social distancing. Do not come to class if you are feeling unwell, have COVID-19 symptoms, or have had a possible exposure to someone with COVID-19.

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. I will post chapters from the book as the course progresses. The book also provides details that we might not discuss in class. Additional readings from other sources will be assigned during the semester. **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., 2018, *Supply Chain Management: Strategy, Planning, and Operation*, 7th 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.
- Nahmias, S. and T. L. Olsen, 2005, *Production and Operations Analysis*, 7th ed., Long Grove, IL: Waveland Press.

Requirements: Your grade will be based on four components:

1. *Homework* (40%): You will be assigned homework every week or so. 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. *Quizzes* (30%): There will be a short (<1 hour) quiz every few weeks. Quizzes will be open book, open notes.
3. *Final exam* (20%): You will be given a final exam. The exam will be cumulative and will be open book, open notes.
4. *Class participation* (10%): You are expected to attend class regularly, come to class prepared, participate in the discussions we have in class and on Slack, and ask questions when you are confused.

Homework Policy: The homework assignments are likely to take you a fair amount of time, so don't wait until the last minute. You may work on the homework assignments individually or with a partner. If you work with a partner, you and your partner should submit a single write-up. Remember that you are ultimately responsible for mastering the material on your own, and your performance on the quizzes and exam 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.

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 'Supply Chains for Dummies' when solving this problem." I also encourage you to contact me or the TA for help when you are stuck.

Submissions must be made electronically, via Slack DM, to the TA.

Computational Software: For general computation tasks, I will use Python in class, but you may instead use MATLAB, Microsoft Excel, or another language or software package of your choice.

For optimization models, I will use AMPL 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 Slack in the `ise362-software` channel. I have also posted a link to an AMPL tutorial video. 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.

Course Communications: Slack will be our primary platform for communication. I will not use CourseSite for this course. You should already have received an invitation to our Slack workspace, `ISE362-FA21`. I will post announcements, slides, readings, homework assignments and their solutions, and other essential materials for the course on Slack. Please check there regularly. I recommend also setting your Notification preferences to receive notifications each time a new message is posted, at least on the `#announcements` channel. (The desktop and mobile apps are more reliable than the web app for notifications, in my experience.)

To contact me, please don't email me; DM me on Slack instead. I will do my best to respond quickly.

Use of Mobile Devices: The use of cell phones, tablets, laptops, and other electronic devices is prohibited in class, except when instructed otherwise. 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.

Academic Integrity: Please read the material on Academic Integrity available on the Provost's Academic Integrity site (`http://www.lehigh.edu/~inprv/faculty/academicintegrity.html`) and on the CITL web site (`https://citl.lehigh.edu/academic-integrity-resources`). Examples of behavior that violates Lehigh's academic integrity principles include (but are not limited to) plagiarism, cheating, copying assignments from previous semesters, creating disruptions, unfairly exploiting the efforts of others, etc.

Perhaps the most misunderstood violation of academic integrity is plagiarism. 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 so-called "innocent plagiarism," in which an author essentially quotes another author's work when attempting to paraphrase it. For more information about what plagiarism is and what counts as plagiarism, see `https://libraryguides.lehigh.edu/plagiarism`.

Work that violates the academic integrity principles will receive a grade of 0, and **repeat offenses will be grounds for failure for the course.**

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.

Course Outline: The following is a tentative outline of the course. I may add, subtract, or rearrange topics as the semester progresses.

Chapter	Topic
1	Introduction
3	Deterministic Inventory Models
4	Stochastic Inventory Models: Periodic Review
5	Stochastic Inventory Models: Continuous Review
7	Pooling and Flexibility
2	Forecasting and Demand Modeling
8	Facility Location Models
9	Supply Uncertainty
10	The Traveling Salesman Problem
11	The Vehicle Routing Problem
12	The Bullwhip Effect
—	Wrap-up, Misc.