

IE 412: Quantitative Models in Supply Chain Management

Spring 2011

Syllabus

Instructor: Prof. Larry Snyder

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Class Hours: TTh 2:35–3:50 PM, Mohler 453

Office Hours: T 12:30–1:30 PM, F 1:00–2:30 PM, and by appointment

Teaching Assistant: Gengyang Sun, ges209@lehigh.edu, Mohler 476, office hours T 4:00–5:30 PM and by appointment

Course Description: The purpose of this course is to study quantitative models for fundamental topics in supply chain management (SCM). Our primary focus will be on the *theory* of SCM. We will also, to a more limited extent, discuss how these theories are put into *practice*.

The goals of this course are to provide students with:

1. a thorough understanding of problems faced by supply chain managers
2. a set of quantitative tools for addressing these problems
3. an overview of the current topics in academic research on supply chain management to serve as a basis for students' own research in the field

Prerequisites: IE 316 (optimization) and 339 (stochastic models), or the consent of the instructor. Although not a formal prerequisite, some previous exposure to basic inventory models (EOQ, newsboy, (Q, R) , etc.) from a previous course on inventory, production, or logistics will be very helpful—undergraduate-level coverage is fine. In addition, we will be writing mathematical proofs in this class, so it will be very helpful if you have some previous experience with formal proof-writing.

Readings: The textbook for the course is

- Snyder, L. V. and Z.-J. M. Shen, 2011, *Fundamentals of Supply Chain Theory*, Hoboken, NJ: John Wiley and Sons.

This book is not available in print yet. Instead, I will distribute paper copies of the sections of the book we will cover.

This textbook is copyrighted material. Please respect the copyright (and the authors) and do not distribute the book to other people without my written consent.

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

- Chopra, S. and P. Meindl, 2003, *Supply Chain Management: Strategy, Planning, and Operation*, 2nd ed., Upper Saddle River, NJ: Prentice-Hall.
- 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.
- Nahmias, S., 2005, *Production and Operations Analysis*, 5th ed., New York: McGraw-Hill Irwin.
- Tayur, S., R. Ganeshan, and M. Magazine (eds.), 1999, *Quantitative Models for Supply Chain Management*, International Series in Operations Research and Management Science, Boston: Kluwer.
- Simchi-Levi, D., X. Chen, and J. Bramel, 2004, *The Logic of Logistics: Theory, Algorithms, and Applications for Logistics and Supply Chain Management*, 2nd ed., New York: Springer.

In addition, you will be assigned journal articles that are relevant to the topics we discuss in class, and you will be required to write a short summary of the article; see below.

Requirements:

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. Final exam

You will be given a final exam in take-home format that will test your understanding of the material covered in class. The exam will be handed out on Thursday, April 28 (the last day of class) and will be due one week later, on Thursday, May 5. You may use books, notes, and any other sources, except people (other than me).

3. Journal article write-ups

You will be required to write a short (roughly 1/2-page) summary of each assigned article. Your write-up should include a summary of what problem the paper is trying to solve, how the authors solve the problem, what insights are gained from the paper, and how the paper fits into the overall literature. In short, what contributions does the paper make to the literature?

You may also find it helpful to include your own personal thoughts about the paper—for example, that the solution technique might be applicable to a problem in your own research, or that you find the assumptions bogus, or that you think a particular extension would be interesting to pursue.

The idea here is to develop a library of abstracts, in your own words, of some seminal papers in SCM, which you will find valuable in your future classes or research on the topic. Write-ups are due during the class period in which we discuss the paper. I will give you one or two class periods' notice before each write-up is due.

4. Class participation

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.

Your grade will be calculated as follows:

Item	M.S. Students	Ph.D. Students
Homework assignments	35%	35%
Final exam	35%	35%
Journal article write-ups	15%	15%
Class participation	15%	15%

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.*

Cooperation on homework assignments is encouraged; however, each student must turn in a separate write-up. 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 ‘Risk Pooling for Dummies’ when solving this problem.” I also encourage you to come to me for help when you are stuck.

CourseSite: I will use CourseSite to post lecture notes, readings, 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 www.lehigh.edu/library/guides/PlagiarismStudent.html.

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 Cell Phones: The use of cell phones, smart phones, iPods, and other hand-held 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. Cell phones are a distraction both to the students and to the instructor and may not be used.

Use of Recording Devices: Audio or video recording devices may be used only with the approval of the instructor and *all* course participants. If you wish to use a digital recorder, smart pen, or other recording device in class, please discuss it with me first.

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

Week of	Sections	Topics Covered
Jan 17	Chap. 1	Introduction
	Chap. 3	Deterministic inventory models
Jan 24	§4.1–4.3	Stochastic inventory models
Jan 31	§6.2–6.3	Risk pooling and postponement
Feb 7	§6.4	Transshipments
Feb 14	§6.5–6.7	Inventory models with supply uncertainty
Feb 21	§7.2	The uncapacitated fixed-charge location problem (UFLP)
	§8.2	The stochastic UFLP
Feb 28	§8.3	The location model with risk pooling (LMRP)
Mar 7		SPRING BREAK
Mar 14	§8.4	Facility location with disruptions
Mar 21	§10.1	The bullwhip effect; the beer game
Mar 28	§10.1–10.2	The bullwhip effect (cont'd); the reverse bullwhip effect
Apr 4	§11.1	Supply chain contracts
Apr 11	§11.2	Supply chain auctions
Apr 18	§5.3	The strategic safety stock placement problem
Apr 25		TBD