

IE 460 – Quantitative Methods in Supply Chain Management
Bilkent University, Department of Industrial Engineering
Fall 2023

Instructor

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Teaching Assistant

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Course Schedule

Tuesday 8:30-10:20, Thursday 13:30-15:20 (EE-03) All hours will be used until November 28th, 2023. There will be no lectures starting December 2nd, 2023. (Of course, if all go as planned)

Catalog Description:

Economies of scale in the supply chain, quantity and transportation discounts. Multi-stage inventory and production systems, risk pooling, decentralized and centralized modeling approaches, bullwhip effect. Supply chain coordination, strategic games in supply chains, and contracting. More complicated examples from industry.

Course Summary

Supply chain management manages materials, information and financial flows in a network of suppliers, manufacturers, distributors, and customers. The topics covered in this course include logistics network configuration, risk pooling and multi-echelon inventory systems, the value of information in supply chains, coordination of the supply chain using contracts and other mechanisms, distribution strategies for the supply chain and product design for supply chain efficiency.

Course Objectives

- Introduce basic notions of supply chains.
- Teach key concepts in supply chains: risk pooling, centralization vs. decentralization, information distortion/bullwhip effect, and postponement.
- Introduce solution techniques that can be applied for supply chain planning.
- Build appreciation on several aspects of supply chains.

Prerequisites (Strongly recommended) – IE202, IE325, IE375

Course Textbook

(CM) Chopra, S., and Meindl, P., *Supply Chain Management: Strategy, Planning and Operation*, Prentice Hall, 6th Global Edition, 2016 AND **(CM)** Chopra, S., and Meindl, P., *Supply Chain Management: Strategy, Planning and Operation*, Pearson, 7th Global Edition, The textbook is available at the bookstore.

Supplemental Texts

(SPT) Silver, E.A., Pyke, D., and Thomas, J.T., "Inventory and Production Management in Supply Chains," 4th Edition, CRC Press, 2016

(SKS) Simchi-Levi, D., Kaminsky, P., and Simchi-Levi, E., *Designing and Managing the Supply Chain: Concepts, Strategies, and Cases*, 2nd edition, McGraw-Hill, 2003 ISBN: 0-07-119896-2 (or a newer version that might be available in the library).

Papers from different academic journals used as supplements are available on the course WEB page.

Grading

- * Exam 1 – October 12, Thursday, 13:40-15:30 (in class) - (25%)
- * Exam 2 – November 9, Thursday, 13:40-15:30 (in class) - (25%)
- * Final Exam – (30%) – Date and Location: TBA
- * Homework + Cases (Total: 20%) – 5 individual HW assignments, each 2%, two CASE studies with a group size of 2-3 students, 4% and 6%. See the detailed schedule on the WEB (Schedule).

Grade FZ

20% of all graded material before the FZ grade submission final date.

Course Outline (There are slight changes from the generic outline)

1. Introduction
2. Inventory Management – Review and Further
3. Inventory Management – Joint Replenishment, Two-Stage Problems
4. Cycle Inventories and Supply Chain – Review and Further
5. Cycle Inventories and Supply Chain (Quantity Discounts)
6. Supply Chain Coordination – Contracting
7. Supply Chain Coordination – Contracting
8. Supply Chain Coordination – Bullwhip Effect – Information Distortion
9. Transportation Issues in Supply Chain
10. Risk Pooling, Centralization
11. Distribution Systems
12. Inventory Positioning
13. Strategic Supply Chain – Location
14. Postponement and Design

Relation of reading material, including course textbook and lectures:

The course textbook is one of the best on the topic if one wants a quick reference for supply chains and its various subtopics. The textbook utilizes an IE overlook with less emphasis on the actual mathematical models but more on the intuition parts. However, in this course, we will go beyond the models described in the textbook with additional quantitative material covered in class utilizing other references which will be supplied in the course WEB site.

Course Conduct Policy:

1. All students, assistants and instructors of the course are expected to
 - Respect each other.
 - Help each other in creating a suitable environment for learning.
 - Help each other to have a fair assessment of the work done.
2. Students are responsible for checking the course website for course material, updates and announcements. The address of the website is to be announced.

Homework/Case Submission Policy:

For all these assignments, due dates are fixed; no late assignment will be accepted. An assignment submission box will be placed in front of the office (Location: TBA) about two days before the submission date and will be removed at the time of the deadline. It would help if the assignments were placed in the designated box before the submission deadline.

Homework Grading Policy:

The homework grades will not be only based on the correctness of the answers provided but on the perceived degree of effort on the returned assignment. This approach will leave no motivation to students to use other solutions, as even without obtaining correct answers, one can obtain full credit. The detailed grading scale will be announced for each assignment separately.

Make-up policy:

(1) There is no make-up for the homework assignments. In some rare cases, the course instructor may modify the grading percentages.

(2) For exams, if you have a legitimate health reason:

a. To satisfy university requirements, a student should follow the administrative path and officially submit his/her health report.

b. The student should contact the instructor immediately (same day) after the expiration date of your health report. If there is no contact, the student may lose his/her right to get a make-up. The make-up exam can be at any time (oral or written) after the expiration date of the health report.

Academic Dishonesty:

Academic misconduct is not tolerated, and violations will be treated following the University policy.

· For assignments: Discussion of the course material and working in groups are effective ways of learning. However, this does not mean one can copy the assignment from one of the friends. A student can discuss the homework material with peers but is expected to be alone, without any written solution to look at when the final version of the assignment is prepared. It is crucial to understand the value of this exercise in learning. Any violation of the above understanding will result in measures outlined in the student rules and regulations.

· For exams: The students are expected to act under the following statement they will be asked to sign: *Academic integrity is expected of all students of Bilkent University at all times, whether in the presence or absence of faculty members. Understanding this, I declare that I shall not give, use or receive unauthorized aid in the examination.* Any violation of the above understanding will result in measures outlined in the student rules and regulations.

Solutions to exams, homework and claims for grade change:

(1) No solutions will be distributed for the exams or assignments. However, a detailed "Comments" document will be prepared for each homework and exam. This document will be on the questions asked and will discuss several related issues, including how grading was performed, as well as the sketch of the solution and possible extensions. It will also contain information on the performance of the class, shared successes, common mistakes, etc.

(2) For any of the assessment activities, you are expected to pick up your assignment (except the exams). If a student has concerns about how the work has been graded, please write the claim and ask for re-grading. The outcome will be mailed directly to the e-mail account of the person who objected. Note that the teaching assistant's office hours should be used to pick up the assignments or check exams. In some cases, additional hours may be announced, and the students are expected to come within those hours. If a student can not make those hours, he/she can write an e-mail to the teaching assistant asking for an appointment.

Privacy policy:

Grade information and other personal information will not be disclosed publicly. Please do not demand to learn somebody else's grade or other pertinent personal information. Also, phone inquiries are not accepted.