

IE 513 – Inventory Theory

Course Syllabus

(2026-2027 Fall)

Credit Hour: (3 0 3)

ECTS: 7.5

Prerequisite(s):-

Catalog Description

This course covers classical models in inventory theory and their extensions. Both deterministic and stochastic inventory models, with emphasis on the latter, will be investigated from a theoretical point of view. Inventory costs; EOQ model and extensions; deterministic and stochastic models with fixed or variable reorder intervals and lead times; multi-echelon models; heuristic solutions to some inventory models.

Textbook

- Zipkin, Paul H., Foundations of Inventory Management, McGraw-Hill, 2000, 0-256-11379-3.
- Sven, Axsater, Inventory Control, Springer, 3rd Ed., 2015, 978-3-319-15728-3.
- Porteus, Evan L., Taha, H.A., Foundations of Stochastic Inventory Theory, Stanford University Press, 2002, 978-0804743990.

Reference Book

- Muckstadt, John A. and Sapra, Amar, Principles of Inventory Management: When You Are Down to Four, Order More, Springer, 2010, 978-0387244921.

Course Definition

The main objectives of this course are developing:

- a thorough understanding of classical inventory models like the EOQ, newsboy, (Q,R), and base-stock models,
- familiarity with a set of quantitative tools for analyzing the costs and optimal solutions for such policies,
- an understanding of the relationship among the classical models,
- a thorough knowledge of the approaches to multi-echelon inventory systems that have been proposed in the literature,
- a sampling of the more complex models that have been developed using classical models as a basis.

Learning Outcomes

On successful completion of the course, all students will develop:

- a thorough knowledge of the core inventory models, their limitations, insights and solutions,
- skills in applying knowledge of inventory models,
- become familiar with quantitative modelling and analysis of inventory systems,
- comprehend stochastic inventory problems, multi-item, multi-level systems and the interactions between various levels of stocking decisions.

Computer Usage

Spreadsheets and report writing software, occasionally other computer software packages will be needed for assignments.

Grading

Homeworks(3)- 30%

Midterm(1)- 30%

Project(1) - 10%

Final Exam(1)- 30%

Lecture Hours

Wednesday 18:00—21:00 (Balgat Campus/A307)

Lecturer

Ertan Yakıcı, Prof. Dr.

Office: L-329, eyakici@cankaya.edu.tr

Office hour: TBD

IMPORTANT NOTES

- You are responsible for all announcements made in class and on class web page. You are also responsible for printing the assignments and lecture notes from the course webonline. Every student should study regularly from the textbook.
- If a student misses midterm exam or final exam and has a valid excuse for his/her absence, a make-up exam will be given. A make-up exam may have a different format and may contain different type of questions than the regular exam.

Course Outline: A tentative outline is given below and the instructor reserves the right to make changes as he sees necessary.

Week	Topics
1	Introduction to inventory theory, Inventory costs
2	Single-Echelon Systems: Deterministic lot sizing (EOQ, EPQ, Quantity discounts)
3	Single-Echelon Systems: Deterministic lot sizing models (Backorders, Time-varying demand)
4	Single-Echelon Systems: Reorder points (Continuous review, Fill-rate, Periodic Review)
5	Single-Echelon Systems: Newsvendor, Lost sales, Stochastic lead times
6	Single-Echelon Systems: Joint optimization of order quantity and reorder point, Optimality of ordering policies
7	Coordinated Ordering: Powers of two policies, production smoothing
8	Coordinated Ordering: Joint replenishment
9	Multi-Echelon Systems: Structures and Ordering policies
10	Multi-Echelon Systems: Lot sizing
11	Multi-Echelon Systems: Lot sizing (Constant demand, Time-varying demand)
12	Multi-Echelon Systems: Reorder points (The Clark-Scarf model)
13	Multi-Echelon Systems: Reorder points (some other models)
14	Multi-Echelon Systems: Reorder points (some other models)