Course Outline MIM

Title: Materials and Inventory Management in Supply Chain	
Lecturer: M.R. Gholamian　　　　　Tel: 5067	
e-Mail: Gholamian@iust.ac.ir　Department: Industrial Engineering	

Prerequisite

Overview Main; Master of Industrial Engineering: Logistic and Supply Chain Engineering

Goal
The objective of this course is to learn more advanced inventory models for specially dealing with supply chain and logistic problems. Although we will cover both deterministic and stochastic inventory models but more emphasis on the latter.

Objectives

Knowledge or Comprehension Objectives
1- Introduction to Multi-Echelon Systems
2- Introduction to LRU and SRU Concepts in METRIC Systems
3- Introduction to Practical Inventory Models with subject to Perishability, Disruption, Returns and coordination

Skills Objectives
1- Deterministic Models in Supply Chain
2- Stochastic Models in Supply Chain
3- Practical Models in Supply Chain

Attitude Objectives
1- Understand the Inventory Role in Supply Chain
2- Understand the principles of Inventory Modeling in Supply Chain

Materials

Week	Subject	Table of Contents
1	Deterministic Models	Inventory policies Deterministic Inventory Models in Supply Chain Echelon Based Inventory Models in Supply Chain
2	Deterministic Models	Roundy's 98 Percent Approximation Echelon Based Time Varying Demand
3	Stochastic Models	Service Levels • Guaranteed Service Model Approach • Coordination and Contracts in Supply Chain
4	Stochastic Models	Multi-Period Models Bivariate Periodic/Continues Review Models
5	Multi-Echelon Systems	The Concept of Echelon Propositions on Echelon Stock The Clark-Scarf Approach

6	Multi-Echelon Systems	An Introduction to METRIC Approach The Optimization Techniques for METRIC Approach
7	Perishable Inventory Systems	Deterministic Models with Perishability Shelf Life Optimization Models
8	Perishable Inventory Systems	Probabilistic Perishable Inventory Models Multi-Period Perishable Inventory Models
9	Inventory Systems with Disruptions	Inventory Systems with Supply Disruptions Inventory Systems with Manufacturing Disruptions Inventory Systems with Demand Disruptions
10	Green Inventory Systems	Environmental Performance and Returns in Inventory Models A Green Inventory Model
11	Coordinated Based Inventory Systems	The Basic Concept of VMI Coordinated Based Inventory Models VMI Modeling Framework VMI Sensitivity Analyses
12	Palm's Theorem & Performance Measures	Palms' Theorem Performance Measures
13	Palm's Theorem & Performance Measures	Convexity and Concavity of Measures Optimization Models of Performance Measures
14	METRIC System	The LRU Concept The LRU Optimization Models The SRU Concept (Multi-Indenture Systems)
15	METRIC System	Lateral Resupply Systems Multi-Echelon Systems With Pooling Environment
16	Advanced METRIC Systems	Capacity-Limited Systems • The Concept of Shortfall • Multi-Echelon Systems with Capacity-Limited • Systems Optimization with Capacity-Limited
17	Advanced METRIC Systems	Real-time Execution Systems • Real-time Execution Concept • The Stock Allocation Model (SAM) • The Extensions of Stock Allocation Model (ESAM, ESAMR)

References

Primary References

- Axsäter, S. (2015) Inventory Control, 3rd Ed., Springer, New York.
- Choi, T-M (2014) Handbook of EOQ Inventory Problems: Stochastic and Deterministic Models and Applications, Springer, New York.
- Hillier, F.S. & Lieberman, G.J. (2015) Introduction to Operations Research, Chapter 18, 10th Ed., McGraw-Hill, New York.
- Muckstadt, J.A. & Sapra, A. (2010) Principles of Inventory Management, Springer, New York.
- Nahmias, S. (2011) Perishable Inventory Systems, Springer, New York.

Additional References

1. Agrawal, N. & Smith, S.A. (2015) Retail Supply Chain Management: Quantitative Models and Empirical Studies, 2nd Ed, Springer, New York.

2. Albrecht, M. (2010) Supply Chain Coordination Mechanisms: New Approaches for Collaborative Planning, Springer, Berlin.

3. Altay, N. & Litteral, L.A. (2011) Service Parts Management: Demand Forecasting and Inventory Control, Springer, New York.

4. Altendorfer, K. (2014) Capacity and Inventory Planning for Make-to-Order Production Systems,

Springer, Berlin.

5. Axsäter, S., Schneeweiss, C. & Silver, E. (1986) Multi-Stage Production Planning and Inventory Control, Springer, Berlin.

6. Bartmann, D. & Beckmann, M.J. (1992) Inventory Control: Models and Methods, Springer, Berlin.

7. Bemelmans, R. (1986) The Capacity Aspect of Inventories, Springer, Berlin.

8. Bensoussan, A. (2011) Dynamic Programming and Inventory Control, IOS Press, Amsterdam.

9. Beyer, D., Cheng, F., Sethi S.P. & Taksar, M. (2010) Markovian Demand Inventory Models, Springer, New York.

10. Davis, R.A. (2016) Demand-Driven Inventory Optimization and Replenishment: Creating a More Efficient Supply Chain, 2nd Ed., Wiley, New Jersey.

11. De Kok, A.G. & Graves, S.C. (2003) Supply Chain Management: Design, Coordination and Operation, North Holland, Amsterdam.

12. Donath, B. (2002) The IOMA Handbook of Logistics and Inventory Management, Wiley, New York.

13. Fiorito, R. (1994) Inventory, Business Cycles and Monetary Transmission, Springer, Berlin.

14. Graves, S.C., RinnooyKan, A.H.G. & Zipkin, P.H. (1993) Logistics of Production and Inventory, North Holland, Amsterdam.

15. Hubner, A. (2011) Retail Category Management: Decision Support Systems for Assortment, Shelf Space, Inventory and Price Planning, Springer, Berlin.

16. Jaber, M.Y. (2009) Inventory Management: Non-Classical Views, CRC Press, Florida.

17. Johnson, L.A. & Montgomery, D.C. (1974) Operations Research in Production Planning, Scheduling, and Inventory Control, Chapter 2, Wiley, New York.

18. Kempf, K.G., Keskinocak, P. & Uzsoy, R. (2011) Planning Production and Inventories in the Extended Enterprise: A State-of-the-Art, Springer, New York.

19. Kleber, R. (2006) Dynamic Inventory Management in Reverse Logistics, Springer, Berlin.

20. Kollintzas, T. (1989) The Rational Expectations Equilibrium Inventory Model, Springer, New York.

21. Lang, J.C. (2010) Production and Inventory Management with Substitutions, Springer, Berlin.

22. Liu, B. & Esogbue, A.O. (2012) Decision Criteria and Optimal Inventory Process, 2nd Ed., Springer, New York.

23. Muckstadt, J.A. (2005) Analysis and Algorithms for Service Parts Supply Chains, Springer, New York.

24. Muller, M. (2011) Essentials of Inventory Management, 2nd Ed, AMACOM, New York.

25. Rahim, M.A. & Ben-Daya, M. (2012) Integrated models in production planning, inventory, quality, and maintenance, 2nd Ed, Springer, New York.

26. Sachs, A-L (2015) Retail Analytics: Integrated Forecasting and Inventory Management for Perishable Products in Retailing, Springer, New York.

27. Sabin, I. (1990) Regenerative Inventory Systems: Operating Characteristics and Optimization, Springer, Berlin

28. Schneeweiss, C.A. (1977) Inventory-Production Theory: A Linear Policy Approach, Springer, Berlin.

29. Sethi, S.P., (2010) Inventory and Supply Chain Management with Forecast Updates, 2nd Ed., Springer, New York.

30. Shanthikumar, J.G., Yao, D.D. & Zijm, W.H.M. (2003) Stochastic Modeling and Optimization of Manufacturing Systems and Supply Chains, Springer, New York.

31. Sherbrooke, C.C. (2013) Optimal Inventory Modeling of Systems Multi-echelon Techniques, 3rd Ed., Springer, New York.

32. Van Houtum, G-J. & Kranenburg, B. (2015) Spare Parts Inventory Control under System Availability Constraints, Springer, New York.

33. Waters, D. (2003) Inventory Control and Management, 2nd Ed, Wiley, New Jersey.

34. Wensing, T. (2011) Periodic Review Inventory Systems: Performance Analysis and Optimization of Inventory Systems within Supply Chains, Springer, Berlin.

35. Zipkin, P.H. (2000) Foundations of Inventory Management, 2nd Ed., McGraw-Hill, New York..

Classroom Methods

    1- Quiz and take homes

    2- Research: Present and Analysis an ISI Paper in Inventory Topics

    3- Present: One (or part of one) Chapter of newest books Related to Inventory in Supply Chain

Evaluation

Final Exam: 60%

Homework: 20%

Research: 20%