



LUNDS UNIVERSITET
Lunds Tekniska Högskola

Course syllabus

Kvantitativa metoder för operationell verksamhetsstyrning

Operations Analytics

MIOF11, 7,5 credits, G2 (First Cycle)

Valid for: 2023/24

Faculty: Faculty of Engineering, LTH

Decided by: PLED I

Date of Decision: 2023-04-14

General Information

Compulsory for: MLOG1

Elective for: I4-pr, I4-lf, M4-lp

Language of instruction: The course will be given in English

Aim

The course aims to give basic knowledge and understanding of methods for management of production and inventory systems, both from a theoretical and applied perspective.

Learning outcomes

Knowledge and understanding

For a passing grade the student must

have knowledge and understanding in the following areas:

be able to use basic quantitative methods for management and evaluation of production and inventory systems

show the ability to independently solve basic project assignments of investigative nature.

This means that the student is required to:

understand and able to apply methods for demand forecasting.

understand and able to apply deterministic network scheduling.

understand the basic principles of Just-in-time production

understand the basic principles of Push and Pull systems.

understand the principles for hierarchical planning of production and personnel and

scheduling.

understand and apply Material requirements planning (MRP).

understand and apply quantitative models for control of single echelon inventory systems with deterministic demand. This involves the EOQ-model and some related variants.

understand different principles for determining cost parameters (such as holding costs, shortage costs and set up costs) commonly used in production and inventory control models.

be able to explain and apply quantitative models for control of single echelon inventory systems with stochastic demand.

be able to explain and apply basic quantitative models for joint replenishments and order coordination in single echelon inventory systems.

be able to explain and apply quantitative models for control of multi-echelon inventory systems with deterministic demand.

understand and use the concept of service levels, and relate models with service levels to penalty cost models.

be able to explain and use quantitative basic methods for analysis of echelon- and installation-stock inventory control policies.

be able to explain and use quantitative methods for lot sizing in multi-echelon systems with deterministic demand.

be able to explain and use quantitative methods for cyclic scheduling.

Competences and skills

For a passing grade the student must

the skills and abilities to independently formulate, solve, and use relevant basic quantitative models for analysis and control.

Concrete areas and model types that the student should master include:

Aggregate production planning (LP and MIP models)

Stochastic models for evaluation and optimisation of single-echelon systems under different assumptions: continuous review, continuous normally distributed demand, discrete compound Poisson demand, deterministic demand, complete backordering, service levels (Serv1, Serv2) and backorder costs, (R,Q), (S-1,S) systems.

Stochastic models for evaluation and optimisation of multi-echelon (supply chain) inventory systems under different assumptions: serial systems, (S-1,S) and (R,Q) policies, echelon-stock versus installation-stock policies, lot sizing under deterministic demand.

Methods for cyclic planning such as: the independent solution, common cycle time, the Doll-Whybark algorithm.

Methods for demand forecasting, such as: moving average, exponential smoothing, exponential smoothing with trend, forecast errors, MAD.

Deterministic inventory models with time varying demand, such as: Silver-Meal, Wagner-Whitin.

Methods for line balancing, such as: Positional weight technique.

Contents

The course focuses on basic methods for production and inventory control. The methods developed in the course are based on theory and concepts from both probability theory and managerial economics. One important aspect of the course is to develop the students skills in how to model and analyze a real life inventory- and production control

problem. For example, how should reorder points and batch quantities be chosen such that minimum costs are attained.

Examination details

Grading scale: TH - (U,3,4,5) - (Fail, Three, Four, Five)

Assessment: The examination is a written exam and a number of home-assignments. The final grade is based on the result from the written exam.

The examiner, in consultation with Disability Support Services, may deviate from the regular form of examination in order to provide a permanently disabled student with a form of examination equivalent to that of a student without a disability.

Parts

Code: 0123. **Name:** Production and Inventory Control.

Credits: 7,5. **Grading scale:** TH.

Code: 0223. **Name:** Practical Work.

Credits: 0. **Grading scale:** UG.

Admission

Assumed prior knowledge: MIO012/MIOA01/MIOA12/MIOA15 Managerial Economics Basic Course, FMS012/FMSF45 Mathematical Statistics Basic Course (or equivalent).

The number of participants is limited to: No

The course overlaps following course/s: MIO030, MIOF10

Reading list

- Axsäter, S., Inventory Control, Springer, 2006. (e-book for LTH students).

Contact and other information

Course coordinator: Johan Marklund, Johan.Marklund@iml.lth.se

Course homepage: <http://www.pm.lth.se>