

MICRO-448

Manufacturing systems and supply chain dynamics

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Cursus	Sem.	Type
Advanced Manufacturing		Opt.
Microtechnics	MA2, MA4	Opt.

Language of teaching	English
Credits	3
Session	Summer
Semester	Spring
Exam	Oral
Workload	90h
Weeks	14
Hours	3 weekly
Courses	2 weekly
Exercises	1 weekly
Number of positions	

Summary

This course discusses quantitatively some important and generic performance and reliability issues that affect the behaviour of supply chains, and in particular manufacturing systems.

Content

Theoretical review: useful probability distributions and concepts of reliability theory, applied stochastic processes, relevant applied queuing systems, discrete-event simulation framework using AnyLogic.

Material flow analysis and reliability issues in manufacturing systems: machines prone to failure, random production flows in buffered transfer lines, decomposition of transfer lines, performance measures, associated discrete-event simulations.

Hedging point policies for manufacturing systems: dynamic programming principles for safety stock computation, optimality of hedging point policies, inventory management, associated discrete-event simulations.

Supply chain dynamics: stability, bullwhip effect, customer demand satisfaction.

Keywords

Stochastic manufacturing systems, production flows, hedging stock policies, inventory management, supply chain dynamics, discrete-event simulations.

Learning Prerequisites**Recommended courses**

MATH 234 Probabilities and Statistics, or similar.

Learning Outcomes

By the end of the course, the student must be able to:

- Identify and characterize the relevant parameters that are influencing material flows in production lines.
- Synthesize the influence of buffers on the performance of transfer lines.
- Compute optimal hedging stock policies.
- Model the general dynamics of simple supply chains, and discuss linear stability issues.
- Examine the behaviour of manufacturing systems and supply chains using a discrete-event simulator.

Assessment methods

Final written exam (80% of the grade), project work during the semester (20% of the grade).

Resources

Ressources en bibliothèque

- [Manufacturing Systems Engineering / Gershwin](#)
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- [Factory Physics / Hopp](#)

Notes/Handbook

Manuscript and slides available in English.

Books:

- Manufacturing Systems Engineering by Stanley B. Gershwin
- Factory Physics by W. J. Hopp and M. L. Spearman
- Stochastic Models of Manufacturing Systems by J. A. Buzacott and J. G. Shanthikumar