

MICRO-448

**Manufacturing systems and supply chain dynamics**

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Cursus	Sem.	Type
Microtechnics	MA2, MA4	Obl.

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

**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](#)
- [Factory Physics / Hopp](#)
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### 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