

Filliger Roger, Gallay Olivier

Cursus	Sem.	Туре	Language of	English
Advanced Manufacturing		Opt.	teaching	Linglish
Microtechnics	MA2, MA4	Opt.	Credits Session Semester Exam Workload Weeks Hours Lecture Exercises Number of positions	3 Summer Spring Oral 90h 14 <b>3 weekly</b> 2 weekly 1 weekly

### Summary

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

#### 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.

### **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.

Transversal skills





- Use a work methodology appropriate to the task.
- Plan and carry out activities in a way which makes optimal use of available time and other resources.
- Use both general and domain specific IT resources and tools
- Write a scientific or technical report.

## Assessment methods

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

## Supervision

Office hours	No
Assistants	No
Forum	Yes

# Resources

Virtual desktop infrastructure (VDI) No

Ressources en bibliothèque

- Manufacturing Systems Engineering / Gershwin
- 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

## Moodle Link

• https://go.epfl.ch/MICRO-448