



# MANUFACTURING SYSTEMS AND SUPPLY CHAIN DYNAMICS

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## Chapter 0: Course Description

*EPFL, Master MT, Spring Semester 2025*

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# Organization

**Schedule:** Friday 10:15-13:00, CE 1103 (courses + exercises)

No course on April 18th and April 25th (Eastern)

**Moodle:** MICRO-448, Manufacturing systems and supply chain dynamics

Course Material (Script, Slides)  
Announcements

**Software:** AnyLogic, Personal Learning Edition  
[www.anylogic.fr](http://www.anylogic.fr)

Matlab

# Course Content

1. *Introduction*
2. *Inventory Theory*
3. *Safety Stock in Manufacturing Systems*
4. *Elements of Queueing Theory*
5. *Productions Flows*
6. *Production Dipole*
7. *Production Lines and Aggregation*
8. *Cooperative Flow Dynamics*
9. *Introduction to Queueing Networks*
10. *Supply Chain Analysis*
11. *Elements of Reliability Analysis*
12. *Maintenance Policies*

# Learning Outcomes

- 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.
- Analyze reliability issues for manufacturing.
- Examine the behaviour of manufacturing systems and supply chains using a discrete-event simulator.

# Evaluation

## **Project Work:**

During the semester

Report to be handed-in on **June 2nd, 2025.**

20% of the grade

## **Exam:**

During exam session

Oral exam

80% of the grade

## Additional Reading

- **Manufacturing Systems Engineering** by S. 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