

ME-419

Production management

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Cursus	Sem.	Type
Managmt, tech et entr.	MA1, MA3	Opt.
Mechanical engineering minor	H	Opt.
Mechanical engineering	MA1, MA3	Opt.
Robotics	MA1, MA3	Opt.

Language of teaching	English
Credits	5
Withdrawal Session	Unauthorized Winter
Semester Exam	Fall During the semester
Workload	150h
Weeks	14
Hours	4 weekly
Courses	2 weekly
Project	2 weekly

Number of positions

Il n'est pas autorisé de se retirer de cette matière après le délai d'inscription.

Summary

Production management deals with producing goods sustainably at the right time, quantity, and quality with the minimum cost. This course equips students with practical skills and tools for effectively managing demand, supply, and implementing advanced analytics in manufacturing companies.

Content

This course is based on the following three modules:

Module 1) Introduction to Production Management

- What is Production Management, and why is it essential?
- **Understanding Linear Supply Chains:** How do traditional production systems operate from sourcing to delivery? What role does production management play in optimizing this flow?
- **Simulation:** How to map value adding network of a manufacturing company? How does supply chain simulation help us design better supply chains?

Module 2) Demand Management

- **Demand Disruptions:** Risks, Variability, Bullwhip Effect
- **Demand Forecasting:** Identifying Demand Drivers, Forecasting Models, Validation
- **Forecasting Methods:** Context, Assumptions, Selection Roadmap
- **Qualitative Methods:** Biases, Executive Opinion, Salesforce Input, Surveys, Delphi
- **Quantitative Methods:** Causal Models, Time Series, Advanced Analytics
- **Forecast Validation:** Measuring accuracy, error types, feedback loops
- **Effective Demand Management:** Key Performance Indicators (KPIs), Visibility, Forecast Planning Tips, Demand Plan/Sales Forecast
- **Simulation:** How to tame bullwhip effect and reduce uncertainty

Module 3) Supply Management

- **Supply Disruptions:** Risks, Variability, Reverse Bullwhip Effect
- **Supply analytics:** Key Drivers, Data Readiness, Model Improvement
- **Production Planning:** AP, MPS, RCCP, MRP
- **Inventory Management:** Classification, Costs, Dynamics, Instability

- **Core Inventory Models:** EOQ, EPQ, Safety Stock, Periodic Review
- **Special Models & Tactics:** Quantity Discounts, Single-Period, Promotions, Supplier Negotiation
- **Effective Supply management:** Key Performance Indicators (KPIs), Visibility, Supply Plan/Shipment plan
- **Simulation:** How to manage inventory and align supply with demand variability

Module 4) Next-Gen Production: Analytics, Sustainability & Circularity

- What are the latest trends in Production Management
- How to effectively orchestrate supply chain (demand and supply) analytics
- **From Linear to Circular:** How are companies shifting from traditional (take-make-dispose) to circular (take-make-return/repair/reuse) models, and how can analytics support this transition?

Keywords

Demand management, Supply management, Sustainability & Circularity, Business Analytics.

Learning Prerequisites

Required courses

- Probability and Statistics

Recommended courses

- Continuous Improvement
- Supply Chain Management
- Data Science

Important concepts to start the course

- Probability & Statistics
- Data Analysis using Excel
- Active listening, engagement, and teamwork

Learning Outcomes

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

- Choose production tools and methods based on performance and cost requirements and needs, taking into consideration applicability limits and associated hypotheses, CP8
- Model, analyse and optimize the internal logistics of a production and distribution system and the dynamic behaviour of a network of companies, CP9
- Design a system based on engineering specifications utilizing suitable numerical and analytical tools for optimizing the design parameters, CP10
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- production tools and methods based on performance and cost requirements and needs, taking into consideration applicability limits and associated hypotheses, CP8

Transversal skills

- Assess progress against the plan, and adapt the plan as appropriate.
- Communicate effectively, being understood, including across different languages and cultures.
- Manage priorities.
- Negotiate effectively within the group.
- Evaluate one's own performance in the team, receive and respond appropriately to feedback.
- Demonstrate the capacity for critical thinking
- Write a scientific or technical report.
- Take feedback (critique) and respond in an appropriate manner.
- Take account of the social and human dimensions of the engineering profession.
- Take responsibility for environmental impacts of her/ his actions and decisions.
- Resolve conflicts in ways that are productive for the task and the people concerned.
- Use both general and domain specific IT resources and tools

Teaching methods

- Formal lectures
- Group activities
- Class discussions
- Hands-on exercises
- Project-based learning
- Games and simulations
- Guest lectures by leading academic and industry figures

Expected student activities

- **Individual:** Self-study, Active class discussions, case evaluations, Q&A
- **In-group:** Teamwork (respect, brainstorming, involvement and constructive feedback)
- **Presentation:** Share your findings weekly in class/group coaching sessions

Assessment methods

Continuous evaluation of case reports, projects, individual and group presentations, class discussions, during the semester. More precisely:

- **25%** Participation, and class engagement,
- **45%** Class assignments, presentations, projects, and case reports,
- **30%** Final (Final report and presentation and understanding of the case)

Supervision

Office hours	Yes
Assistant.e.s	Yes
Forum	Yes
Others	

- Meetings by appointment.
- All information sharing and communication regarding the course must be through Moodle.

Resources

Virtual desktop infrastructure (VDI)

Yes

Bibliography

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Ressources en bibliothèque

- [How smart, connected products are transforming competition / Porter](#)
- [Find all others references at the Library](#)
- [How smart, connected products are transforming companies / Porter](#)

Notes/Handbook

- Course slides (main material)
- Videos
- Hand-outs during the semester

Moodle Link

- <https://go.epfl.ch/ME-419>