ME-419

Production management

Kaboli Amin

Cursus	Sem.	Type
Energy Management and Sustainability	MA1, MA3	Opt.
Managmt, tech et entr.	MA1, MA3	Opt.
Mechanical engineering	MA1, MA3	Opt.
Mineur STAS Chine	H	Opt.
Robotics	MA1, MA3	Opt.

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

It is not allowed to withdraw from this subject after the registration deadline.

Summary

Production management deals with the production of goods/services at the right time, quantity, and quality with the minimum cost. This course will arm students with hands-on tools for demand management, supply management, and digital transformation in manufacturing companies.

Content

This course is based on the following four modules:

Module 1) Introduction to Production Management

- How a production company works and what challenges it faces
- How to lead the production of a given product/service from A to Z
- How to manage sales and operations planning (S&OP)

Module 2) Demand Management – Forecasting

- **Demand management** (data, demand disruptions, bullwhip effect)
- **Forecasting methods** (model selection roadmap, assumptions, context, forecasting steps)
- **Qualitative methods** (executive opinion, salesforce opinion, consumer survey, delphi method)
- **Quantitative methods: Time series-Stationary** (naïve, average, moving average, weighted moving average, exponential smoothing)
- **Quantitative methods: Time series-Trend** (linear trend model, holt model)
- **Quantitative methods: Time series-Trend and Seasonality** (autocorrelation, hotel-winter model)
- **Demand planning** (sales forecast)

Module 3) Supply Management – Production Planning & Inventory Management

- **Supply management** (data, supply disruptions, reverse bullwhip effect)
- **Aggerate production planning strategies** (level plan, chase plan, hybrid plan)
- **Master Production Schedule (MPS)**
- **Capacity Planning** (Rough-Cut Capacity Planning (RCCP), Capacity Planning using Overall)
- **Material Requirement Planning (MRP)**
- **Inventory management** (costs, classification, decision variables)

- **Inventory models** (EOQ, EPQ, quantity discount model, procurement and negotiation with suppliers, safety stock, periodic review model, promotion model/christmas tree/single period inventory model)
- **Supply planning**

Module 4) Digital Transformation in Demand and Supply Management

- How are digital technologies used to optimize production?
- How does digital transformation play a role in scaling-up and speeding-up production?
- What are the digital technologies that can improve demand and supply management?
- How do companies build digital trust and ensure reliable cybersecure systems?

Keywords

Production and Operations Management, Demand Management, Supply Management, Sales and Operations Planning (S&OP), Forecasting, Production Planning, Capacity Planning, Inventory management, Digital Technologies, Digitally Optimize Production, Demand-driven Forecasting, AI-enabled Production Planning, Inventory Management in the Digital Age, Autonomus Warehousing, Digital Trust and Cybersecurity.

Learning Prerequisites

Required courses

Probability and Statistics

Important concepts to start the course

- Data analysis using Excel
- Active engagement
- Advanced level of probability and statistics

Objective of this course

- Understanding how a production company works.
- Recognizing the critical challenges that a production company faces with.
- Analyzing production of a given product/service.
- Knowing how to lead and manage a given product/service from A to Z.

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

Transversal skills

- Assess progress against the plan, and adapt the plan as appropriate.

- Plan and carry out activities in a way which makes optimal use of available time and other resources.
- Use a work methodology appropriate to the task.
- Communicate effectively, being understood, including across different languages and cultures.
- Keep appropriate documentation for group meetings.
- Manage priorities.
- Take feedback (critique) and respond in an appropriate manner.
- Write a scientific or technical report.

Teaching methods

Students work in a group on a single case over the semester and implement theoretical concepts and models to their cases.

- Formal lectures
- Assignments and project-based learning
- Case studies
- Videos
- Articles and research papers
- Guest speakers

Expected student activities

- **Individual:** Self-study, Active class discussions, case evaluations, Q&A
- **In-group:** Teamwork (respect, brainstorming, involvement and constructive feedback)

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 exam (final report and presentation and understanding of the case)

Supervision

Office hours	Yes
Assistants	Yes
Forum	Yes
Others	• Meetings by appointment. • All information sharing and communication regarding the course must be through Moodle.

Resources

Bibliography

-

Ressources en bibliothèque

- Demand-Driven Forecasting: A Structured Approach to Forecasting / Chase

- The Digital Transformation Playbook / Rodgers
- Manufacturing Planning and Control for Supply Chain Management / Vollman
- Manufacturing operations management / Yoo
- Operations Management / Slack

Notes/Handbook

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

Moodle Link

- http://moodle.epfl.ch/course/view.php?id=48