
# INGE1312 Production and Operations Research

[45h+15h exercises] 6 credits

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Language: French
Level: First cycle

## Aims

This course provides a general introduction to production and operational management, one of the primary functions of business management.
The course objectives are (1) to familiarise students with the problems and fundamental issues facing production managers, (2) to describe and analyse the language, the concepts usually used in resolving these issues with a view to gaining a competitive advantage through operational management, (3) to study the tools and steps involved in the quantitative management methods used to model and tackle these problems.
A process vision of operations is adopted to capture and analyse the fundamental dimensions of operations management, such as capacity management, cycle time management, logistics and quality management. These processes are conceived as basic technologies that all organisations use to produce and distribute goods and services able to meet consumers' expectations.
To study the problems of operational management effectively, the course is divided into three parts or steps. First, students must learn how to model and understand production processes and the product and information flows associated with them. Part 2 examines the causal relations between the structure of the processes and their performances. Lastly, a systematic analysis of management levers and their impact on process performance identifies implications for managerial action.
This modelling approach focused on the analysis of managerial action in operations management is strengthened by a systematic study of the principal quantitative management methods underpinning such an approach.
This product-oriented course serves as an introduction to the specialist option in "Problems and Methods in Production and Operations Management ". In addition to the advanced courses offered within this option, there is another optional course intended for other specialist options which deals with operations management within the service sector.

## Main themes

Operations Management
Description, analysis and strategic management of production processes.
Products, processes and performance
Management strategies, product-process matrix
Measure of production flow
Performance measures: output rate, cycle time, stock
Process modelling and cycle time analysis
Production rate modelling and capacity analysis
Stock level modelling and management
Action levers: cycle time, output rates and stock levels
Management of uncertainty and variability in production flow
Service rate and strategic stock
Service periods and capacity reserves
Control and mastery of processes, process capability
Integration
Improvement of flow on a site: design, flexibility, variability
Improvement of flow in the logistical chain: synchronisation
Continuous improvement process
Methodological tools
Linear programming
Modelling and optimisation: case studies
Duality and sensitivity analysis
Integer Programming
integer modelling: case studies
branch and bound algorithms
Resolution complexity and heuristics
Stock Management
Deterministic and stochastic models
Demand Forecasting
Time series and extrapolation methods
Causal regression and methods
Introduction to simulation and queuing
Simulation studies
Statistical analysis and interpretation of results
Role of queue models
Introduction to decision analysis and game theory
Decision trees
Decision-making in uncertainty
Game theory

## Other information (prerequisite, evaluation (assessment methods), course materials recommended readings, ...)

Evaluation: The evaluation is the result of a continuous evaluation of students' class activities during the term. A final examination can take place at the end of the course and consists of solving management cases (reference to course notes permitted).

## Other credits in programs

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| **INGE13BA** | Troisième année de bachelier en ingénieur de gestion | (6 credits) | Mandatory |