

# Quantitative Methods in Industrial Operations Management

## General Information

### Number of ECTS Credits

3

### Module code

TSM\_QInOpMgmt

### Valid for academic year

2020-2021

### Last modification

2018-11-06

### Responsible of module

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### Explanations regarding the language definitions for each location:

- Instruction is given in the language defined below for each location/each time the module is held.
- Documentation is available in the languages defined below. Where documents are in several languages, the percentage distribution is shown (100% = all the documentation).
- The examination is available 100% in the languages shown for each location/each time it is held.

	Berne	Lausanne	Lugano	Zurich
<b>Instruction</b>				X E 100%
<b>Documentation</b>				X E 100%
<b>Examination</b>				X E 100%

### Module Category

TSM Technical scientific module

### Lessons

2 lecture periods and 1 tutorial period per week

## Entry level competences

### Prerequisites, previous knowledge

Linear Algebra:

- Solving systems of linear equations with Gaussian elimination
- Vector and matrix calculus

Analysis:

- Differential calculus of one variable

Statistics:

- Fundamentals of probability theory
- discrete and continuous density functions

## Brief course description of module objectives and content

Operations management is concerned with the design, operation and optimization of the value-adding areas of a company. At the strategic level it includes in particular the design of infrastructure and resources, the dimensioning of capacity and the definition of business processes. At an operational level, it includes ongoing planning and control of operational activities. The aim is to achieve high business performance through clever organization and efficient use of resources. In a first part an overview of the classical themes of Operations Management is given. In a second part selected methods of quantitative Operations Management (see Operations Research) are applied to tasks of important areas (see contents below) of Operations Management. These tasks will be analyzed and optimized with the help of mathematical models.

## Aims, content, methods

### Learning objectives and acquired competencies

- The students have an overview of the various areas of Operations Management.
- The students can classify operational issues in the tasks of the Operations Management (i.e. design or operations).
- The students know selected quantitative methods and models of Operations Management.
- The students can make use of the learned methods and are aware of the assumptions and restrictions of these.
- The students can formulate practical questions from Operations Management as mathematical models.

### Contents of module with emphasis on teaching content

Part 1 (2 weeks):

- Overview of the areas of Operations Management (design and operations)
- Focus on operations
  - Overview production planning and control
  - Aggregate planning: Sales & operations planning and master production scheduling

Part 2: From the areas below selected methods of quantitative Operations Management are taught.

- Capacity planning and lead times (1 week)
- MRP concepts, mathematical foundation of MRP planning calculations (2 weeks)
- Lotsizing and inventory control (3-4 weeks)
- Scheduling (5-6 Wochen)

### Teaching and learning methods

Lecture with exercises

### Literature

Will be announced at the beginning of the semester

## Assessment

### Certification requirements

Module does not use certification requirements

### Basic principle for exams

**As a rule, all the standard final exams for modules and also all repetition exams are to be in written form**

### Standard final exam for a module and written repetition exam

Kind of exam

written

Duration of exam

120 minutes

Permissible aids

*Aids permitted as specified below:*

Permissible electronic aids

A hand calculator is permitted. No laptop!

Other permissible aids

All the material of the course is permitted. Open book exam.

**Special case: Repetition exam as oral exam**

**Kind of exam**

oral

**Duration of exam**

30 minutes

**Permissible aids**

*Aids permitted as specified below:*

**Permissible electronic aids**

A hand calculator is permitted. No laptop!

**Other permissible aids**

All the material of the course is permitted. Open book exam.