

ME-499

**Simulation and optimisation of industrial applications**

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Cursus	Sem.	Type
Managmt, tech et entr.	MA2, MA4	Opt.
Mechanical engineering	MA2, MA4	Opt.

Language of teaching	English
Credits	4
Withdrawal Session	Unauthorized Summer
Semester Exam	Spring During the semester
Workload	120h
Weeks	14
<b>Hours</b>	<b>4 weekly</b>
Courses	2 weekly
TP	2 weekly
<b>Number of positions</b>	
<b>It is not allowed to withdraw from this subject after the registration deadline.</b>	

**Summary**

This course deals with the principal techniques and basic methodology of simulation model building and analysis. Important notions such as discrete event simulation and agent-based simulation will be taught in the course.

**Content**

- Different types of simulation modelling: event-based, process, agent-based, system dynamics
- Understanding and using simulation software (AnyLogic).
- Simulation model building: case studies such as manufacturing floor and supply chain, district heat network performance analysis.
- Methodologies for output analysis and performance assessment
- External tools for optimization
- Team Project for the implementation of simulation case study and performance analysis of their model.

**Keywords**

Simulation modelling, Agent-based simulation, Discrete event simulation, Performance analysis, AnyLogic simulation tool

**Learning Prerequisites****Recommended courses**

Production Management (Autumn semestre)

**Important concepts to start the course**

- Experience with computer
- Good knowledge of programming languages, **Java** in preference.

**Learning Outcomes**

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

- Categorize different types of simulation modelling technologies
- Use a simulation tool
- Design simulation model of different cases

- Implement the conceptual model using a simulation tool
- Analyze the performance of the built model
- Apply their knowledge and skills to other contexts of simulation and analysis cases
- Perform optimisation according to chosen criteria

### Transversal skills

- Set objectives and design an action plan to reach those objectives.
- Use both general and domain specific IT resources and tools
- Access and evaluate appropriate sources of information.
- Use a work methodology appropriate to the task.

### Teaching methods

Project-based, industrial case studies, team project, exercise sessions for learning the tool and building case study model

### Expected student activities

- Practicing with the tool: self-study on technical aspects of the software (on-line tutorial, since the tool provides a rich set of functions and libraries, too large to cover only in the classroom)
- searching project ideas
- brainstorming with team members

### Assessment methods

- Intermediary test: written, practical (programming in AnyLogic), individual evaluation
- Project and oral exam (team presentation): end of semester

### Supervision

Office hours	Yes
Assistants	Yes
Forum	Yes

### Resources

#### Bibliography

Averill M. Law, Simulation Modeling and Analysis (5th Edition), McGraw-Hill

#### Ressources en bibliothèque

- [Simulation modeling and analysis](#)

#### Notes/Handbook

- Course slides (main material)
- Anylogic user manual (provided by the company, available online)

#### Moodle Link

- <http://moodle.epfl.ch/course/view.php?id=14850>