

CIVIL-557

**Decision-aid methodologies in transportation**

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<b>Cursus</b>	<b>Sem.</b>	<b>Type</b>
Civil Engineering	MA2, MA4	Opt.
Digital Humanities	MA2, MA4	Opt.

Language of teaching	English
Credits	4
Session	Summer
Semester	Spring
Exam	Oral
Workload	120h
Weeks	14
<b>Hours</b>	<b>4 weekly</b>
Courses	2 weekly
Exercises	2 weekly
<b>Number of positions</b>	

**Remark**

The course is given by various lecturers.

**Summary**

Introduction to operations research, data mining and machine learning algorithms for decision support in transportation systems.

**Content**

The course is case-study based, it will be divided into modules associated to concrete case studies. Each module will contain the following parts:

1. Presentation of the problem, outline of the process, analysis of major difficulties.
2. Formulation of the optimization/data mining/machine learning problem.
3. Introduction to optimization/data mining/machine learning methods.
4. Implementation using software tools.
5. Solution of a concrete problem by the lecturer, using real data.
6. Solution of similar problems by the students, using also real data.

Emphasis will be put on enhancing students' abilities to model and implement decision support methods in transportation systems. During the course the students CPLEX and OPL language for mathematical optimization and Matlab for data mining and machine learning algorithms. Basic programming skills are required for the successful participation to the course.

**Learning Prerequisites****Required courses**

Recherche opérationnelle

**Learning Outcomes**

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

- Model decision processes in transportation systems as optimization problems.
- Implement and solve optimization/data mining/machine learning problems using state-of-the-art tools and algorithms.
- Know and understand various optimization/data mining/machine learning approaches.

**Teaching methods**

Case-based Teaching and Problem-based Learning

**Assessment methods**

At the end of each module, each group would be required to submit a short report on a series of exercises.

A midterm exam (multiple choice questions) will take place after Easter Holidays and will account for 20% of the final grade.

At the last part of the course, each group of students would be assigned with a final project, in which they will be required to implement approaches learned during the course.

Each group would submit a report and present their project at the end of the course. Assessment would be based on the quality of the report, the quality of the presentation and an oral exam that would take place during the presentation.

**Resources****Ressources en bibliothèque**

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