

CIVIL-459

**Data and artificial intelligence for transportation**

Alahi Alexandre

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

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

**Summary**

Data science and Artificial Intelligence (AI) are poised to reshape the transportation industry with self-driving cars, delivery robots, self-moving segways, or smart terminals. In this course, students will learn the fundamentals behind these AI-driven systems.

**Content**

1. Introduction to AI-driven systems
2. Sensing modalities and data in transportation systems
3. Perceiving: how to extract meaningful information from raw data?
  - Intro to machine learning (fundamentals to regression and classification)
  - Intro to deep learning (Neural Network, CNN, regularization techniques)
  - State-of-the-art techniques for localisation, detection, and tracking objects in the context of self-driving cars and smart terminals.
- 4- Predictive models
  - Intro to Recurrent Neural Networks
  - Learning to clone socially-accepted human behavior in the context of self-moving segways
- 5- Acting: challenges and ethical impacts of intelligent transportation systems

The course is case-study based using real data. Students will implement in groups projects in computer vision, robotic controls, localization, path planning, and more. The projects involve parameter tuning and experimentation.

**Keywords**

Intelligent Transportation System, Artificial intelligence, Machine learning, Self-driving car

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

Concepts importants à maîtriser : Fundamentals in Analysis, Linear algebra, Probability and Statistics. Programming skills (although an introductory class to python will be given).

**Learning Outcomes**

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

- Define the fundamental steps behind an AI-driven system
- Design the building steps of a self-driving car, a self-moving segway and a smart terminal
- Implement an algorithm for each step

- Explain and understand the challenges and ethical impacts of intelligent transportation systems

**Assessment methods**

Lab projects (in group): 30%

Midterm: 30%

Final project (in group): 40%