

Course plan for IIA1420 Machine Learning and Sensor Technology

Course code: IIA1420

Study points: 10

Number of semesters: 1 semester

Applies to: Course start autumn 2021

Teaching language: English

Responsible: Department of Electrical engineering, Information Technology and Cybernetics

Academic content in course

The course provide an introduction to machine learning, emphasizing applications within the field of sensor technology. The main content is:

- Machine learning
- Fundamentals of sensor technology
- Signal processing
- Smart/soft sensors
- Experimental design
- Data quality and uncertainty calculations
- Pre-processing data
- Fundamentals of linear algebra
- Fundamentals of probability theory
- Optimization algorithms/theory
- Decision tree
- Neural networks
- Deep learning
- Support vector machines
- Regularization
- Model validation
- Dynamic machine learning models

Required prerequisite knowledge

According to the admission requirements.

Learning outcome

A candidate who has completed IIA1420 Machine Learning (with sensor applications) will have the following learning outcomes in the form of acquired knowledge, skills, and general competence.

The candidate will have KNOWLEDGE about:

- the standard terminology of sensors and uncertainty calculations
- the functional principles and ideas of most of the modern sensors and associated signal processing
- quality assessment of datasets
- the most common machine learning concepts

The candidate will have SKILLS to be capable of:

- selecting and evaluating sensors in a measurement system with multimodal sensors
- planning experimental designs
- evaluating and pre-processing datasets
- select appropriate machine learning models in practical/industrial applications
- validating the machine learning models

The candidate will have GENERAL COMPETENCE in:

- communicating/discussing with peers problems related to sensor technology and machine learning
- developing innovative solutions using machine learning
- to document and evaluate his/her work in reports

Learning activities

Learning/teaching will be based on

- lectures
- exercises
- case projects with final report and oral presentation
- on-line resources

The course is followed by all the three versions of IIA-students, the campus-, the online-, and the industry master students. The course contents and the learning material used in the course will be the same in the online and the campus-based programmes, however with some differences in the organization of the course: In the online version of the course, there are no ordinary lectures. A number of relevant videos produced by the instructor(s), or external videos, are provided, both for the online- and for the campus-based students. There will be a mandatory gathering for the students following the industry master programme. The online course will have no mandatory gatherings, whereas the campus students might have some mandatory experimental work at campus.

Forms of assessment

Written exam without any aids counts for 100% of the final grade.

To have a final grade in the course, the given assignments must to be submitted and approved.

Examination support material

None

Approved course plan

Revised by the Dean's approval January 2020