

# Introduction to Machine Learning (3 ECTS)

## **Prerequisites**

Basic mathematics, for example, linear algebra, vector and matrix operations, linear combination, basic multivariate calculus, and so on. It is preferable to have a basic programming skill and to be able to use basic data structures and algorithms.

## **Course content**

### **Core content level**

Introduction to MATLAB for implementation of machine learning algorithm.

Linear regression and least squares method.

Introduction to artificial neural networks.

- Formal neuron and perceptron.

- Linear regression using a single-layer perceptron network.

- Multi-layer perceptron network and feed-forward network functions.

- Neural network learning based on back-propagation algorithms.

Handwritten character recognition using neural network algorithms.

### **Additional content**

Recognition of some characters written by the students using the neural network model.

## **Core content level learning outcomes**

### **Knowledge and understanding**

The students will know some basic concept and some algorithms of machine learning for regression and classification and they will understand how to implement them on MATLAB. They also will know an artificial neural network model for handwritten character recognition and they will be able to implement both the neural network learning and recognition algorithm on MATLAB.

### **Skills**

The students are able to understand basic machine learning algorithms especially artificial neural networks and make use of MATLAB programs for implementation of the algorithms.

## **Evaluation methods**

Daily exercises assigned on the course are worth 50% and both a report and products (i.e. program source code, sample dataset, experimental results, and so on) about handwritten character recognition are worth 50%.