Machine Learning for Smart Cities

Maskininlärning för smarta städer
6 credits

Programme course

TNK129

Valid from: 2025 Spring semester

Determined by	**Main field of study**	
Board of Studies for Industrial Engineering and Logistics	Computer Science and Engineering, Electrical Engineering	
Date determined	**Course level**	**Progressive specialisation**
2024-08-28	Second cycle	A1N
Revised by	**Disciplinary domain**	
	Technology	
Revision date	**Subject group**	
	Computer Technology	
Offered first time	**Offered for the last time**	
Autumn semester 2023		
Department	**Replaced by**	
Institutionen för teknik och naturvetenskap		

Course offered for

- Master of Science in Communications, Transport and Infrastructure
- Master's Programme in Intelligent Transport Systems and Logistics

Prerequisites

Basic knowledge in linear algebra, calculus, statistics and probability theory as well as computer programming.

Intended learning outcomes

In this course, you will learn how to utilize advanced models and deep learning architectures to learn from data in order to gain insights for decisions in smart city applications.

After completing the course, the student should be able to:

- Explain assumptions and theory behind different type of machine learning methods
- Explain and motivate differences in characteristics between different type of methods and give examples of when they should be applied
- Evaluate and choose among different methods for a specific problem instance and dataset
- Use existing datasets to train and evaluate different machine learning models
- Use selected machine learning models for prediction, inference and decision-making for smart city applications

Course content

The course aims to provide knowledge in machine learning. The course will cover both conventional machine learning methods as well as deep learning. The course content includes statistical inference, bias-variance tradeoff, Bayesian learning, Gaussian processes, support vector machines, kernels, neural networks, deep learning and reinforcement learning.

Teaching and working methods

Lectures, tutorials and labs.

Examination

UPG1	Individual assignments	2 credits	U, 3, 4, 5
PRA1	Project work	2 credits	U, G
LAB1	Lab assignments	2 credits	U, G

Grades for examination modules are decided in accordance with the assessment criteria presented at the start of the course.

Grades

Four-grade scale, LiU, U, 3, 4, 5

Other information

About teaching and examination language

The teaching language is presented in the Overview tab for each course. The examination language relates to the teaching language as follows:

- If teaching language is “Swedish”, the course as a whole could be given in Swedish, or partly in English. Examination language is Swedish, but parts of the examination can be in English.
- If teaching language is “English”, the course as a whole is taught in English. Examination language is English.
- If teaching language is “Swedish/English”, the course as a whole will be taught in English if students without prior knowledge of the Swedish language participate. Examination language is Swedish or English depending on teaching language.

Other

The course is conducted in such a way that there are equal opportunities with regard to sex, transgender identity or expression, ethnicity, religion or other belief, disability, sexual orientation and age.

The planning and implementation of a course should correspond to the course syllabus. The course evaluation should therefore be conducted with the course syllabus as a starting point.

The course is campus-based at the location specified for the course, unless otherwise stated under “Teaching and working methods”. Please note, in a campus-based course occasional remote sessions could be included.