# DD2424 Deep Learning in Data Science 7.5 credits

## Djupinlärning i Data Science

This is a translation of the Swedish, legally binding, course syllabus.

## Establishment

The official course syllabus is valid from the autumn semester 2024 in accordance with the decision from the director of first and second cycle education: J-2024-1035.Decision date: 2024-04-05

## Grading scale

A, B, C, D, E, FX, F

## Education cycle

Second cycle

## Main field of study

Computer Science and Engineering

## Specific prerequisites

Knowledge and skills in programming, 6 credits, equivalent to completed course DD1337/DD1310-DD1319/DD1321/DD1331/DD100N/ID1018.

Knowledge in linear algebra, 7,5 higher education credits, equivalent to completed course SF1624/SF1672/SF1684.

Knowledge in multivariable analysis, 7,5 higher education credits, equivalent to completed course SF1626/SF1674.

Knowledge in probability theory and statistics, 6 higher education credits, equivalent to completed course SF1910-SF1924/SF1935.

Knowledge in machine learning or artificial intelligence, 6 higher education credits, equivalent to completed course DD1420/DD2421 or DD2380/ID1214.

Active participation in a course offering where the final examination is not yet reported in LADOK is considered equivalent to completion of the course.
Registering for a course is counted as active participation.
The term 'final examination' encompasses both the regular examination and the first re-examination.

## Language of instruction

The language of instruction is specified in the course offering information in the course catalogue.

## Intended learning outcomes

After the course, one will be able to:

- explain the basic the ideas behind learning, representation and recognition of raw data
- account for the theoretical background for the methods for deep learning that are most common in practical contexts
- identify the practical applications in different fields of data science where methods for deep learning can be efficient (with special focus on computer vision and language technology)

in order to:

- be able to solve problems connected to data representations and recognition
- be able to implement, analyse and evaluate simple systems for deep learning for automatic analysis of image and text data
- receive a broad knowledge enabling you to learn more about the area and read literature in the area

## Course contents

- Learning of representations from raw data: images and text
- Principles of supervised learning
- Elements for different methods for deep learning: convolutional networks and recurrent networks
- Theoretical knowledge of and practical experience of training networks for deep learning including optimisation using stochastic gradient descent
- New progress in methods for deep learning
- Analysis of models and representations

- Transferred learning with representations for deep learning
- Application examples of deep learning for learning of representations and recognition

## Examination

- TEN1 - Examination, 3.0 credits, grading scale: A, B, C, D, E, FX, F
- LAB2 - Laboratory work, 4.5 credits, grading scale: P, F

Based on recommendation from KTH's coordinator for disabilities, the examiner will decide how to adapt an examination for students with documented disability.

The examiner may apply another examination format when re-examining individual students.

If the course is discontinued, students may request to be examined during the following two academic years.

The moment TEN1 is includes both oral and written examination.

By making an optional project assignment the students can improve their final grade.

## Ethical approach

- All members of a group are responsible for the group's work.
- In any assessment, every student shall honestly disclose any help received and sources used.
- In an oral assessment, every student shall be able to present and answer questions about the entire assignment and solution.