



FDD3601 Deep Generative Models and Synthesis 7.5 credits

Djupa generativa modeller och syntes

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

Establishment

The official course syllabus is valid from the autumn semester 2026 according to the Director of Third Cycle Education. Decision date: 2026-05-11

Grading scale

P, F

Education cycle

Third cycle

Specific prerequisites

Intended learning outcomes

After passing the course, the students should be able to:

- characterise synthesis tasks, deep generative methods, and their applications
- distinguish different objectives, performance measures, and common problems with generative modelling
- describe the relation between deep generative models and regression-based methods
- train and tune deep generative models on different datasets
- evaluate generative models objectively and subjectively

- discuss ethical aspects of particular relevance to generative AI

in order to

be able to judiciously use deep generative modelling to solve problems in industry and/or academia.

Course contents

- Relevant concepts from probability theory and estimation
- Introduction to synthesis tasks and generative models
- Principles of synthesis versus classification
- Regression versus probabilistic modelling
- Modelling goals and evaluation
- Mixture density networks (MDNs)
- Autoregression and large language models (LLMs)
- Normalising flows
- Variational autoencoders (VAEs)
- Diffusion models and flow matching
- Generative adversarial networks (GANs)
- Subjective evaluation
- Hybrid approaches
- Recent developments
- Ethical and societal aspects of generative AI

Examination

- LAB1 - Laboratory work, 7.5 credits, grading scale: P, F

Examination is based on several exercises which includes both programming and theoretical questions and contains different parts for higher grades.

Other requirements for final grade

The final grade is determined by accumulating the grades in individual exercises.

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.