# FDD3268 Applied Quantum Machine Learning 5.0 credits

## Tillämpad kvantmaskininlärning

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

## Establishment

Course syllabus for FDD3268 valid from Autumn 2023

## Grading scale

P, F

## Education cycle

Third cycle

## Specific prerequisites

Knowledge of basic machine learning techniques and linear algebra is required. Experience with Python is required.

## Language of instruction

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

## Intended learning outcomes

After passing the course, the student will be able to:

- Describe and discuss how to develop a machine-learning application using a quantum-parametrized circuit
- Design and implement a machine learning application using quantum machine learning software
- List the differences between classical and quantum approaches for machine learning
- Compare the cost of quantum machine learning with traditional computing regarding power consumption

## Course contents

The course is divided into two modules:

Module I - Introduction to Qubits, Quantum Gates and Circuits: Introduction to quantum computing, qubits, quantum gates, and quantum circuits.

Module II - Quantum Machine Learning with Parametrized Quantum Circuits: data encoding, training parametrized quantum circuits, variational classification, quantum feature maps, and kernels.

In addition, we discuss the sustainability aspects of quantum machine learning.

## Examination

- EXA1 - Examination, 5.0 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.

To pass the course, the student must pass an advanced final project (report and presentation).

## 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.