

Quantum Machine Learning

Kvantmaskininläring
6 credits

Programme course

TSIT06

Valid from: 2026 Spring semester

Determined by	Main field of study	
	Computer Science and Engineering, Applied Physics	
Date determined	Course level	Progressive specialisation
2025-08-28	Second cycle	A1F
Revised by	Disciplinary domain	
	Information missing	
Revision date	Subject group	
Offered first time	Offered for the last time	
2026		
Department	Replaced by	
Institutionen för systemteknik		

Course offered for

- Master of Science in Applied Physics and Electrical Engineering

Intended learning outcomes

After completing the course the student should be able to:

1. use relevant concepts and methods in quantum machine learning to formulate, structure and solve practical problems.
2. infer the parameters in a number of common quantum machine learning models.
3. evaluate and choose among models.
4. implement quantum machine learning models and algorithms in a programming language.

Course content

- Introduction to machine learning, and introduction to quantum computers, a brief introduction to quantum mechanics
- Representation of classical data in quantum systems, coding and embedding, quantum data representation and quantum feature map
- Quantum algorithms for machine learning, quantum classifiers, quantum mechanical kernel methods, quantum clustering
- Quantum variational circuits, quantum neural networks, quantum convolutional neural networks (QCNNs), quantum federated learning (QFL), quantum reinforcement learning (QRL), kvantmekanisk multimodal inläring
- Research directions in the area
- Applications of QML in language models, computer vision, health care, medicin design, transport, and intrusion detection

Examination

TEN1	Written examination	4 credits	U, 3, 4, 5
LAB1	Laboratory work	2 credits	U, G

Grades

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