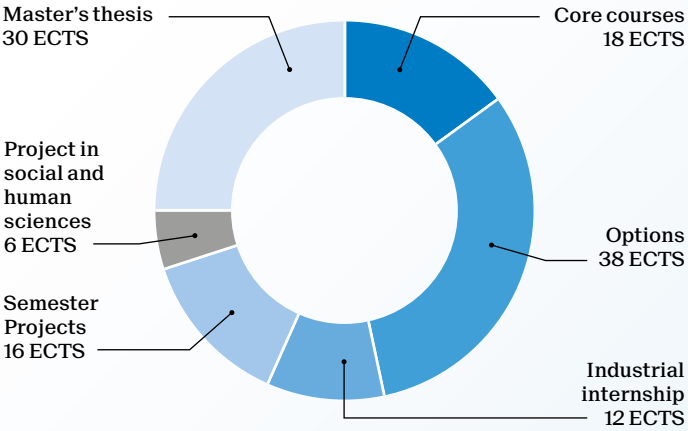
Master of Science in

QUANTUM SCIENCE AND ENGINEERING

2-year program - 120 ECTS



	Credits
Core courses	**18**
Computational complexity	6
Computational quantum physics	6
Fundamentals of quantum sensing and metrology	5
Fundamentals of solid-state materials	4
Introduction to quantum computation	5
Introduction to quantum cryptography	6
Introduction to quantum information processing	5
Introduction to quantum science and technology	5
Quantum and nanocomputing	6
Quantum electrodynamics and quantum optics	6
Quantum mechanics for non-physicists	5
Semiconductor devices I	4
Solid state systems for quantum information	4

Students can choose their option classes within one specialization:
A. Quantum information and computation
B. Quantum hardware and engineering

Students seeking for an interdisciplinary profile have the possibility of not choosing a specialization.

It is possible to take up to 8 credits within the other specialization or outside this study plan (upon validation by the program's committee).

Options			**38**
Advanced cryptography	A		6
Algorithms II	A		8
Aspects of quantum science and sustainability	A	B	3
Atomistic and quantum simulations of materials		B	4
Classical and quantum photonic transducers		B	3
Computational methods in molecular quantum mechanics	A	B	4
Cryptography and security	A		8
Deep learning		B	4
Deep reinforcement learning	A		6
Distributed algorithms	A		8
Foundations of data science	A	B	8
Fundamentals of integrated photonic components		B	4
Information theory and coding	A		8
Interacting quantum matter	A		4
Introduction to electronic structure methods	A	B	4
Lab in nanoelectronics		B	4
Machine learning	A	B	8
Machine learning II		B	4
Machine learning for physicists	A		6
Mathematics of data: from theory to computation		B	6
Metrology		B	3
Metrology praticals		B	2
Microwave engineering in physics		B	4
Molecular dynamics and Monte-Carlo simulation	A	B	2
Molecular quantum dynamics	A	B	3
Nanoelectronics		B	2
Nanotechnology		B	3
Nonlinear optics for quantum technologies	A	B	4
Optimization for machine learning	A		8
Photonic systems and technology		B	4
Physics of photonic semiconductor devices	A	B	4
Properties of semiconductors and related nanostructures		B	5
Quantum computing	A	B	6
Quantum information theory	A	B	4
Quantum optics and quantum information	A	B	6
Quantum physics II	A	B	6
Quantum physics IV	A		6
Quantum transport in mesoscopic systems	A	B	4
Randomized matrix computations	A		5
Semiconductor devices II		B	4
Semiconductor physics and light-matter interaction	A	B	4
Solid state physics III	A		6
Statistical mechanics	A	B	4
Statistical physics IV	A	B	6

Career prospects

Given the wide range of topics covered by this Master's program, graduates acquire a comprehensive set of skills enabling them to become the main actors of the next "quantum revolution" as many companies are increasingly embracing quantum information technology, both at the level of research and development, and within a proactive implementation strategy at the level of advanced services. Besides pursuing careers in quantum science, their interdisciplinary profile also enables graduates to thrive in the information technology sector and in the industry at large.

Schools of Basic Sciences,
Engineering, Computer and Communication Sciences
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