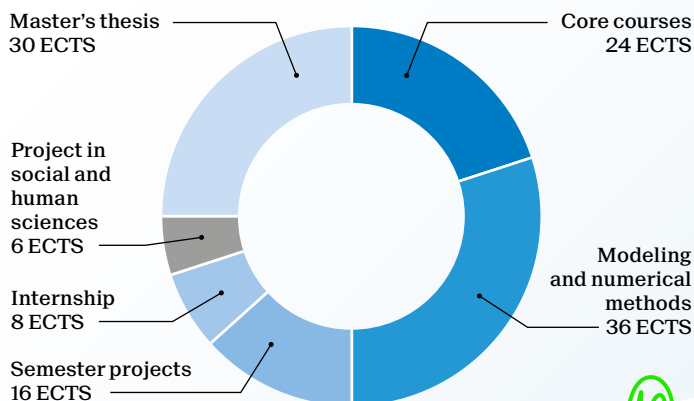


Master of Science in COMPUTATIONAL SCIENCE AND ENGINEERING

2-year program - 120 ECTS

36



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In the Modeling and numerical methods group, students have to choose 3 out of the 4 lists and complete at least 8 ECTS in each of them.

Internship

The program includes a compulsory 8-week internship which can be extended to 6 months.

Career prospects

EPFL is a world leader in computing, engineering and fundamental sciences. A Master in Computational Science and Engineering from EPFL opens the door to top employment with computational skills in a broad spectrum of industries, not only in all branches of engineering, but also in emerging and vibrant market sectors including energy, financial and pharmaceutical R&D. It is also a strong asset for a PhD in Computational Science.

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School of Basic Sciences
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Contact: cse@epfl.ch

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	Credits
Core courses	24
Advanced numerical analysis	5
Algorithms	8
Computer simulation of physical systems I	4
Image processing I	3
Introduction to multiprocessor architecture	4
Machine learning	8
Molecular dynamics and Monte-Carlo simulation	2
Numerical analysis and computational mathematics	4
Parallel and high-performance computing	4
Programming concepts in scientific computing	4
Software engineering	4

Modeling and numerical methods	36
Computational modeling based on differential equations	8 min.
Atomistic and quantum simulations of materials	4
Computational neurosciences: neuronal dynamics	5
Dynamical system theory for engineers	6
Environmental transport phenomena	5
Hydrodynamics	5
Instability	3
Numerical flow simulation	5
Principles and applications of systems biology	3
Turbulence	5

Computational modeling based on discrete systems	8 min.
Computational methods in molecular quantum mechanics	4
Distributed intelligent systems	5
Geometric computing	6
Image processing II	3
Introduction to electronic structure methods	4
Mathematical foundations of signal processing	6
Mathematical modeling of behavior	5
Molecular quantum dynamics	3
Structural biology	4
Understanding advanced molecular simulation	4

Numerical methods, algorithms, high performance systems	8 min.
Advanced multiprocessor architecture	6
Computational linear algebra	5
Inference on graphs	5
Low-rank approximation techniques	5
Numerical approximation of PDEs	5
Numerical integration of stochastic differential equations	5
Numerical methods for conservation laws	5
Numerics for fluids, structures and electromagnetics	5
Stochastic simulation	5

Data science	8 min.
Algorithms II	8
Applied data analysis	8
Artificial neural networks/reinforcement learning	6
Deep learning	4
Deep learning in biomedicine	6
Foundations of data science	8
Information security and privacy	8
Mathematics of data: from theory to computation	6
Optimization for machine learning	8
Statistics for data science	8
Systems for data management data science	8