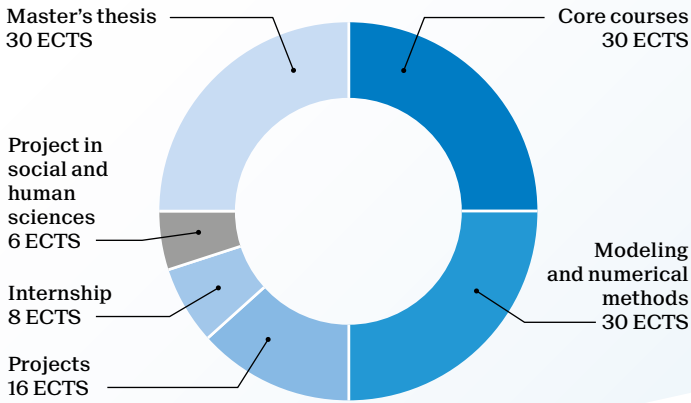


# Master of Science in COMPUTATIONAL SCIENCE AND ENGINEERING

2-year program - 120 ECTS



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 and combined with the Master's thesis.

## 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.

School of Basic Sciences  
[go.epfl.ch/master-computational-science-engin](http://go.epfl.ch/master-computational-science-engin)  
 Contact: [cse@epfl.ch](mailto:cse@epfl.ch)

	Credits
<b>Core courses</b>	<b>30</b>
Advanced numerical analysis	5
Algorithms	6
Computational physics III	3
Computer simulation of physical systems I	4
Dynamique moléculaire et simulations Monte Carlo	2
Image processing I	3
Introduction to multiprocessor architecture	3
Machine learning	7
Numerical analysis and computational mathematics	4
Numerical integration of dynamical systems	5
Parallel and high-performance computing	4
Programming concepts in scientific computing	4
Software engineering	4

<b>Modeling and numerical methods</b>	<b>30</b>
<b>Computational modeling based on differential equations</b>	<b>8 min.</b>
Advanced continuum mechanics	3
Atomistic and quantum simulations of materials	4
Biological modeling of neural networks	4
Dynamical system theory for engineers	4
Environmental transport phenomena	5
Hydrodynamics	5
Instability	3
Numerical flow simulation	5
Particle-based methods	4
Principles and applications of systems biology	3
Turbulence	4

<b>Computational modeling based on discrete systems</b>	<b>8 min.</b>
Biomolecular structure and mechanics	4
Computational methods in molecular quantum mechanics	4
Digital 3D geometry processing	5
Distributed intelligent systems	5
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
Signal processing for communications	6
Understanding advanced molecular simulation	4
Water quality modeling	4

<b>Numerical methods, algorithms, high performance systems</b>	<b>8 min.</b>
Advanced multiprocessor architecture	6
Combinatorial statistics	5
Computational finance	5
Computational linear algebra	5
Convex optimization and applications	4
Introduction to multiprocessor architecture	3
Low-rank approximation techniques	5
Mathematical modeling of DNA	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 simulations	5

<b>Data science</b>	<b>8 min.</b>
Advanced algorithms	7
Applied data analysis	6
Artificial neural networks	5
Deep learning	4
Foundations of data science	6
Information security and privacy	6
Mathematics of data: from theory to computation	4
Optimization for machine learning	4
Statistics for data science	6
Systems for data science	6