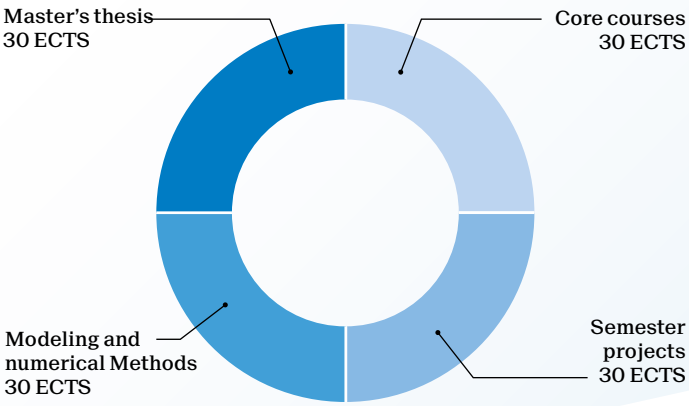
ÉCOLE POLYTECHNIQUE
FÉDÉRALE DE LAUSANNE

Master of Science in

COMPUTATIONAL SCIENCE AND ENGINEERING

2-year program - 120 ECTS



	Credits
Core courses	**30**
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 the finite elements method	5
Numerical analysis and computational mathematics	4
Numerical integration of dynamical systems	5
Parallel computing and pthreads	4
Programming concepts in scientific computing	4
Software Engineering	6

Semester projects	**30**
Project in computational science and engineering I, II	16
Industrial internship	8
Project in human and social sciences	6

Modeling and numerical Methods	**30**
Computational Modeling Based on Differential Equations	8 min.
Advanced methods in computational solid 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	5
Numerical flow simulation	5
Numerical methods in heat transfer	3
Particle-based methods	4
Principles and applications of systems biology	3
Quantum simulations of materials: Properties and spectroscopies	4
Turbulence	3

Computational Modeling Based on Discrete Systems	8 min.
Applied molecular quantum chemistry	4
Biomolecular structure and mechanics	4
Computational methods in molecular quantum mechanics	4
Computer simulation of physical systems II	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 modelling of behavior	4
Molecular quantum dynamics	2
Signal processing for communications	6
Water quality modeling	4

Numerical Methods, Algorithms, High Performance Systems	8 min.
Advanced Algorithms	7
Advanced multiprocessor architecture	6
Convex optimization and applications	4
Computational Finance	5
Computational linear algebra	5
Mathematical modeling of DNA	5
Computer algebra	5
Numerical approximation of partial differential equations I	5
Numerical approximation of partial differential equations II	5
Numerical integration of stochastic differential equations	5
Numerical methods for conservation laws	5
Numerical methods for electromagnetics	5

Simulation based engineering

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 high demand 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.

Career prospects

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