### Core courses (30 ECTS)

- Advanced numerical analysis
- Algorithms
- Computational physics III
- Computer simulation of physical systems I
- Dynamique moléculaire et simulations Monte Carlo
- Image processing I
- Numerical analysis and computational mathematics
- Numerical integration of dynamical systems
- Parallel and high-performance computing
- Programming concepts in scientific computing
- Software Engineering

### Semester projects (30 ECTS)

- Project in computational science and engineering I, II
- Industrial internship
- Project in human and social sciences

### Modeling and numerical Methods (30 ECTS)

- Computational Modeling Based on Differential Equations
- Advanced methods in computational solid mechanics
- Atomistic and quantum simulations of materials
- Biological modeling of neural networks
- Dynamical systems theory for engineers
- Environmental transport phenomena
- Hydrodynamics
- Instability
- Numerical flow simulation
- Particle-based methods
- Principles and applications of systems biology
- Quantum simulations of materials: Properties and spectroscopies
- Turbulence

- Computational Modeling Based on Discrete Systems
- Biomolecular structure and mechanics
- Computational methods in molecular quantum mechanics
- Digital 3D geometry processing
- Distributed Intelligent Systems
- Image processing II
- Introduction to electronic structure methods
- Mathematical foundations of signal processing
- Mathematical modeling of behavior
- Molecular quantum dynamics
- Signal processing for communications
- Understanding advanced molecular simulation
- Water quality modeling

- Numerical Methods, Algorithms, High Performance Systems
- Advanced multiprocessor architecture
- Computational Finance
- Computational linear algebra
- Convex optimization and applications
- Introduction to multiprocessor architecture
- Low-rank approximation techniques
- Mathematical modeling of DNA
- Numerical approximation of partial differential equations I
- Numerical approximation of partial differential equations II
- Numerical integration of stochastic differential equations
- Numerical methods for conservation laws
- Numerical methods for saddle point problems
- Stochastic simulations

### Data Science (30 ECTS)

- Advanced Algorithms
- Applied data analysis
- Artificial neural networks
- Deep learning
- Information security and privacy
- Information theory and signal processing
- Machine learning
- Mathematics of Data: From Theory to Computation
- Optimization for machine learning
- Statistics for data science
- Systems for data science

### 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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