### Core courses
- Advanced numerical analysis: 5 credits
- Algorithms: 6 credits
- Computational physics III: 3 credits
- Computer simulation of physical systems I: 4 credits
- Dynamique moléculaire et simulations Monte Carlo: 2 credits
- Image processing I: 3 credits
- Introduction to multiprocessor architecture: 3 credits
- Numerical analysis and computational mathematics: 4 credits
- Numerical integration of dynamical systems: 5 credits
- Parallel and high-performance computing: 4 credits
- Programming concepts in scientific computing: 4 credits
- Software Engineering: 6 credits

### Modeling and numerical Methods
- Computational Modeling Based on Differential Equations: 8 min.
- Advanced Continuum Mechanics: 5 credits
- Homomorphic and quantum simulations of materials: 4 credits
- Biological modeling of neural networks: 4 credits
- Dynamical system theory for engineers: 4 credits
- Environmental transport phenomena: 5 credits
- Hydrodynamics: 5 credits
- Instability: 3 credits
- Numerical flow simulation: 5 credits
- Particle-based methods: 4 credits
- Principles and applications of systems biology: 3 credits
- Turbulence: 4 credits

### Computational Modeling Based on Discrete Systems
- Biomolecular structure and mechanics: 4 credits
- Computational methods in molecular quantum mechanics: 4 credits
- Digital 3D geometry processing: 5 credits
- Distributed intelligent systems: 5 credits
- Image processing II: 3 credits
- Introduction to electronic structure methods: 4 credits
- Mathematical foundations of signal processing: 6 credits
- Mathematical modelling of behavior: 5 credits
- Molecular quantum dynamics: 3 credits
- Signal processing for communications: 6 credits
- Understanding advanced molecular simulation (donné les années paires): 4 credits
- Water quality modeling (donné les années paires): 4 credits

### Numerical Methods, Algorithms, High Performance Systems
- Advanced multiprocessor architecture: 6 credits
- Combinatorial statistics: 5 credits
- Computational finance: 5 credits
- Computational linear algebra: 5 credits
- Convex optimization and applications: 4 credits
- Introduction to multiprocessor architecture: 3 credits
- Low-rank approximation techniques (pas donné en 2019-20): 5 credits
- Mathematical modelling of DNA: 5 credits
- Numerical approximation of PDEs: 5 credits
- Numerical integration of stochastic differential equations: 5 credits
- Numerical methods for conservation laws: 5 credits
- Numerical methods for saddle point problems (pas donné en 2019-20): 5 credits
- Stochastic simulations: 5 credits

### Data Science
- Advanced algorithms: 7 credits
- Applied data analysis: 6 credits
- Artificial neural networks: 4 credits
- Deep learning: 4 credits
- Information security and privacy: 6 credits
- Information theory and signal processing: 6 credits
- Machine learning: 7 credits
- Mathematics of data: from theory to computation: 4 credits
- Optimization for machine learning: 4 credits
- Statistics for data science: 6 credits
- Systems for data science: 6 credits

### Projects
- Project in computational science and engineering I, II: 16 credits
- Industrial internship min: 8 weeks: 8 credits
- Project in human and social sciences: 6 credits

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**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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