Master of Science in **APPLIED MATHEMATICS**
2-year program - 120 ECTS

Students may choose following tracks:
- Algebra and geometry
- Algorithmic and Discrete Mathematics
- Analysis
- Numerical Analysis
- Probability
- Statistics

Among the Optional courses (44 ECTS)
4 ECTS have to be taken within the following engineering courses (non-exhaustive list):
- Biological modeling of neural networks
- Biomedical signal processing
- Signal processing for communications
- Statistical signal and data processing through applications
- Applied data analysis
- Algorithms
- Advanced Algorithms
- Information theory and coding
- Investments
- Credit risk
- Fixed income analysis
- Quantitative risk management
- Principles of Microeconomics
- Relativity and cosmology I
- Relativity and cosmology II

The students may choose a Minor program in Engineering (30 ECTS) and shorten the industrial internship.

**Optional courses**

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<tr>
<th>Courses</th>
<th>Credits</th>
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<tbody>
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<td>44 ECTS</td>
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**Algebra and Geometry**
- Algebraic curves and cryptography: 5 ECTS
- Differential geometry of framed curves: 5 ECTS
- Gödel and recursivity: 5 ECTS
- Homotopical algebra: 5 ECTS
- Introduction à la géométrie riemannienne: 5 ECTS
- Introduction to algebraic geometry: 5 ECTS
- Linear algebraic groups: 5 ECTS
- Lie groups: 5 ECTS
- Number theory in cryptography: 5 ECTS
- Representation theory of semisimple Lie algebras: 5 ECTS
- Riemann surfaces: 5 ECTS
- Set theory: 5 ECTS
- TNT: Automorphic forms and L-functions: 5 ECTS

**Algorithmic and Discrete Mathematics**
- Combinatorial Geometry: 5 ECTS
- Combinatorial optimization: 5 ECTS
- Convexity: 5 ECTS
- Mathematical modelling of behavior: 5 ECTS
- Optimal transport: 5 ECTS
- Packing and covering: 5 ECTS
- Probabilistic methods: 5 ECTS

**Analysis**
- Analyse fonctionnelle II: 5 ECTS
- Analysis on groups: 5 ECTS
- Dispersive PDEs: 5 ECTS
- Harmonic analysis: 5 ECTS
- Parabolic and hyperbolic PDEs: 5 ECTS

**Numerical Analysis**
- Computational linear algebra: 5 ECTS
- Computational finance: 5 ECTS
- Mathematical modelling of DNA: 5 ECTS
- Mathematical physiology: 5 ECTS
- Numerical approximation of PDEs II: 5 ECTS
- Numerical integration of dynamical systems: 5 ECTS
- Numerical integration of stochastic differential equations: 5 ECTS
- Numerical methods for conservation laws: 5 ECTS
- Numerical methods for saddle point problems: 5 ECTS

**Probability**
- Computational finance: 5 ECTS
- Lattice models: 5 ECTS
- Martingales in financial mathematics: 5 ECTS
- Probabilistic methods: 5 ECTS
- Probability theory: 5 ECTS
- Stochastic simulations: 5 ECTS
- Théorie du calcul stochastique: 5 ECTS

**Statistics**
- Bayesian computation: 5 ECTS
- Biostatistics: 5 ECTS
- Gaussian vectors and processes: 5 ECTS
- Modern regression methods: 5 ECTS
- Multivariate statistics: 5 ECTS
- Risk, rare events and extremes: 5 ECTS
- Robust and nonparametric statistics: 5 ECTS
- Statistical machine learning: 5 ECTS
- Statistical inference on graphs: 5 ECTS
- Statistical mechanics and Gibbs measure: 5 ECTS
- Statistical theory: 5 ECTS
- Statistics for genomic data analysis: 5 ECTS

**Projects**
- 16 ECTS
- Project in Mathematics: 10 ECTS
- Project in human and social science: 6 ECTS

**Industrial Internship**
- 30 ECTS
- Industrial Internship in Applied Mathematics: 30 ECTS

School of Basic Sciences
[go.epfl.ch/master-applied-mathematics](http://go.epfl.ch/master-applied-mathematics)
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