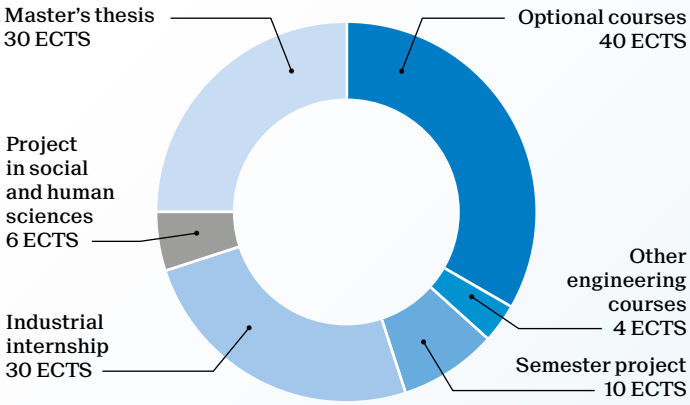
Master of Science in

APPLIED MATHEMATICS

2-year program - 120 ECTS



Students must choose at least 30 ECTS worth of courses labelled A.

Optional courses are classified in the following tracks:

- Algebra and geometry
- Algorithmic and discrete mathematics
- Analysis
- Numerical analysis
- Probability and interactions / Statistics

On top of the Optional courses (40 ECTS) students must choose 4 ECTS in another engineering program, except if they opt for a 30 ECTS engineering minor.
Approved courses sample:

- Applied data analysis
- Artificial neural networks
- Biomedical signal processing
- Data vizualisation
- Deep learning
- Information security and privacy
- Information theory and coding
- Investments
- Mathematics of data
- Optimisation for machine learning
- Quantitative risk management
- Relativity and cosmology
- Signal processing for communications
- Statistical signal and data processing through applications

Students opting for a minor in engineering may shorten their industrial internship.

		Credits
Optional courses	**A**	**40**
Algebra and geometry		
Abstract analysis on groups		5
Advanced analytic number theory		5
Algebraic geometry II - Schemes and sheaves		10
Algebraic geometry III - Selected topics		5
Complex manifolds		5
Differential geometry IV - General relativity		5
Ergodic theory		5
Introduction à la géométrie riemannienne		5
Linear algebraic groups		5
Number theory - Modular forms		5
Number theory - Selected topics		5
Number theory - Cryptography	A	5
Representation theory of semisimple lie algebras		5
Riemann surfaces		5
Spectral theory	A	5
Student seminar in pure mathematics		5
Topics in arithmetic geometry		5
Topology IV.a -Algebraic K-theory		5
Topology IV.b - Homotopy theory		5
Topology V.a - Homotopical algebra		5
Topology V.b - Cohomology rings		5
Algorithmic and discrete mathematics		
Diophantine approximation		5
Integer optimisation	A	5
Mathematical modeling of behavior	A	5
Metric embeddings		5
Analysis		
Calculus of variations		5
Dispersive PDEs		5
Distribution and interpolation spaces		5
Harmonic analysis		5
Introduction to dynamical systems		5
Lattice models	A	5
Nonlinear Schrödinger equations		5
Optimal transport		5
Numerical analysis		
Computational linear algebra	A	5
Error control in scientific modeling	A	5
HPC for numerical methods and data analysis	A	5
Numerical integration of dynamical systems	A	5
Numerical integration of stochastic differential equations	A	5
Numerical methods for conservation laws	A	5
Numerics for fluids, structures and electromagnetics	A	5
Optimization on manifolds	A	5
Randomized matrix computations	A	5
Topics in machine learning	A	5
Probability and interactions / Statistics		
Applied biostatistics	A	5
Applied statistics	A	5
Biostatistics	A	5
Concentration of measures		5
Empirical processes	A	5
Foundations of probabilistic proofs	A	6
Gaussian processes	A	5
Introduction to stochastic PDEs	A	5
Multivariate statistics	A	5
Nonparametric estimation and inference	A	5
Regression methods	A	5
Statistical analysis of network data	A	5
Statistical computation and visualisation	A	5
Statistical inference	A	5
Statistical machine learning	A	5
Statistical mechanics and Gibbs measures	A	5
Statistical theory	A	5
Statistics for genomic data analysis	A	5
Stochastic epidemic models	A	5
Stochastic simulation	A	5
Theory of stochastic calculus	A	5
Topics in high-dimensional probability	A	5
Topics in stochastic analysis	A	6
Other courses		
Gödel and recursivity		5
Martingales in financial mathematics	A	5
Set theory		5

School of Basic Sciences
go.epfl.ch/master-applied-mathematics
Contact: sma@epfl.ch

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