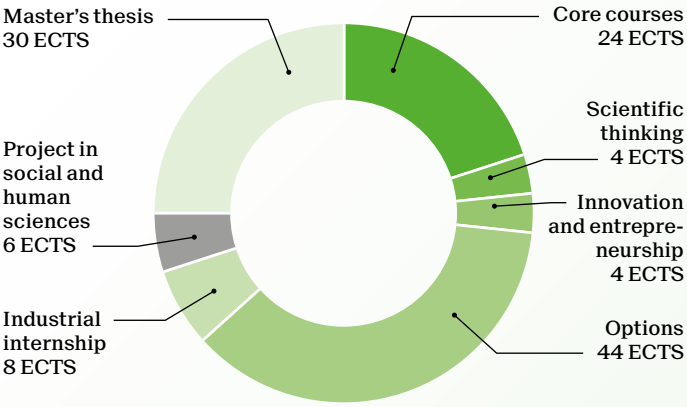
Master of Science in

LIFE SCIENCES ENGINEERING

2-year program - 120 ECTS



Students may choose a 30 ECTS specialization:

B Biomedical engineering
J Molecular health
K Biological data science
L Neuroscience

Or opt for a 30 ECTS minor included in the 120 ECTS. Minors recommended with this Master:

- Biomedical technologies
- Biotechnology
- Computational biology
- Data science
- Engineering for sustainability
- Imaging
- Management, technology, entrepreneurship
- Neuro-X
- Physics of living systems

	Specializations				Credits
Core courses	**B**	**J**	**K**	**L**	**24**
Core courses in Life sciences engineering					12
Genomics and bioinformatics					4
Life Sciences engineering: genome to function					4
Next-generation biomaterials					4
Core courses in engineering and computation					12
Applied biostatistics	B	J			5
Applied biomedical signal processing					4
Applied data analysis			K		8
Applied probability and stochastic processes					4
Biomicroscopy I	B			L	4
Dynamical system theory for engineers					6
Image processing I					3
Machine learning					8

Scientific thinking					**4**
Scientific literature analysis in:					
Bioengineering					4
Computational molecular biology					4
Neuroscience					4
Scientific project design in:					
Cell and developmental biology					4
Drug discovery					4
Integrative neurosciences					4
Translational oncology					4

	Specializations				Credits
Innovation and entrepreneurship	**B**	**J**	**K**	**L**	**4**
Concept to early-stage drug and medtech products					4
Entrepreneurship in food and nutrition science					4
Entrepreneurship in life sciences					4
Innovation management in the digital age					4
Introduction au droit et à l'éthique					4

Options					**44**
Advanced bioengineering methods laboratory					4
Basics in bioinstrumentation					4
Bioimage informatics					4
Biomechanics of the cardiovascular system	B				3
Biomechanics of the musculoskeletal system	B				5
Biomedical optics	B				3
Biomicroscopy II					4
Biophysics: physics of biological systems					4
Biophysics: physics of the cell					3
Biostatistics			K		5
Brain-like computation and intelligence					5
Cancer biology I		J			5
Cancer biology II					5
Causal thinking					5
Computational cell biology			K		4
Computational motor control					4
Computational neurosciences: biophysics					5
Computational neurosciences: neuronal dynamics			K	L	5
Computational optical imaging					3
Controlling behavior in animals and robots					5
Deep learning					4
Deep learning in biomedicine			K		6
Deep reinforcement learning					6
Digital epidemiology			K		4
Ethics for Life sciences engineers					2
Frontiers in chemical biology					3
Fundamentals of biomedical imaging	B				4
Fundamentals of biophotonics	B				3
Fundamentals of biosensors and electronic biochips	B			L	3
iGEM					12
iGEM lab					6
Image analysis and pattern recognition					4
Image processing II					3
Immunoengineering		J			4
Immunology - advances and therapeutic implications		J			5
Infection biology		J			5
Introduction to natural language processing			K		6
Lab immersion I	B	J	K	L	8
Lab immersion II					8
Lab immersion III					12
Lab immersion academic (outside EPFL) or in industry					22
Lab on cell-free synthetic biology					4
Linear models					5
Management of intellectual property					3
Mechanobiology: how mechanics regulate life					3
Methods: from disease models to therapy					4
Methods: omics in biomedical research					4
Micro- and nanorobotics					3
Modern natural language processing					8
Molecular endocrinology: health and environment		J			4
Nanobiotechnology					3
Neural circuits of motivated behaviors				L	4
Neural interfaces					6
Neural signals and signal processing				L	6
Neuroscience				L	4
Neuroscience: behavior and cognition				L	5
Neuroscience: cellular and circuit mechanisms				L	5
Neuroscience: from molecular mechanisms to disease				L	5
New tools and research strategies in personalized health	B	J			4
Nutrition: from molecules to health		J			4
Pharmacology and pharmacokinetics					2
Physics of life					4
Planetary health					4
Principles and applications of systems biology			K		3
Randomness and information in biological data			K		4
Regulatory, quality and clinical affairs					2
Sensors in medical instrumentation	B				3
Single cell biology		J	K	L	4
Statistical physics of biomacromolecules					4
Statistics for data science					8
Stem cells and organoids	B	J			3
Structural biology		J	K		4
Structural mechanics	B	J			4
Synthetic biology				L	4
Systems neuroscience				L	4
Translational neuroengineering					6
Trends in chemical biology and drug discovery					4
Understanding statistics and experimental design					4

School of Life Sciences
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