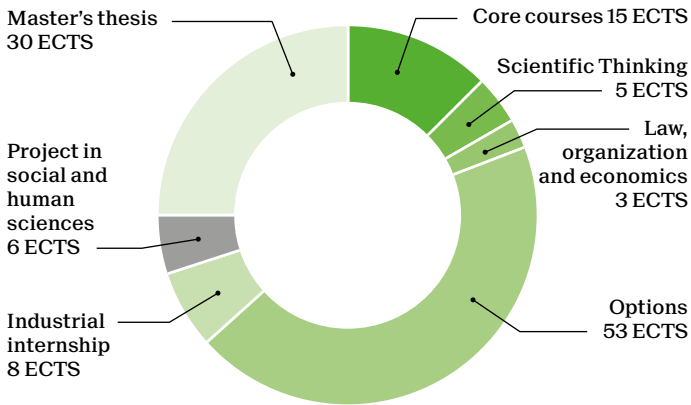


Master of Science in LIFE SCIENCES ENGINEERING

2-year program - 120 ECTS



Students may choose a 30 ECTS specialization:

- A) Biomechanical engineering
- B) Biomedical engineering
- C) Biophotonics and bioimaging
- D) Cellular and molecular engineering
- E) Computational biology
- F) Nanoscale bioengineering
- G) Neuroscience and neuroengineering

Or opt for a 30 ECTS minor included in the 120 ECTS.

Minors recommended with this Master:

- Biocomputing
- Biomedical technologies
- Biotechnologies
- Computational neurosciences
- Management, technology, entrepreneurship
- Neuroprosthetics

	Specializations							Credits
Core courses	A	B	C	D	E	F	G	15
Applied biostatistics	A	B	C	D	E	F		5
Applied data analysis	A	B	C	D	E	F		6
Applied probability and stochastic processes			C		E			4
Biomedical signal processing		B	C		E	F		6
Biomicroscopy I, II	A	B	C	D			G	7
Dynamical system theory for engineers							G	4
Fundamentals of biomedical imaging			C			F		4
Image processing I	A	B	C	D	E	F	G	3
Image processing II			C		E			3
Machine learning			C		E			7
Numerical methods in biomechanics	A	B						3
Understanding statistics and experimental design	A	B	C	D	E	F	G	4

Scientific thinking								5
Scientific literature analysis in:								
Bioengineering								5
Computational molecular biology								5
Neuroscience								5
Scientific project design in:								
Cell and developmental biology								5
Drug discovery								5
Integrative neurosciences								5
Synthetic biology (iGEM)								5
Translational neurosciences								5
Translational oncology								5

	Specializations							Credits
Law, organization and economics	A	B	C	D	E	F	G	3
Economics of innovation and IP								3
Innovation management								3
Introduction au droit et à l'éthique								3
Principles of finance								3

Options								53
Advanced bioengineering methods laboratory	A	B	C	D		F		4
Analog circuits for biochip		B	C			F		3
Analysis and modeling of locomotion	A	B					G	4
Artificial neural networks					E		G	5
Bioimage informatics			C		E			4
Biological modeling of neural networks					E		G	4
Biomaterials	A	B	C			F		4
Biomechanics of the cardiovascular system	A	B						3
Biomechanics of the musculoskeletal system	A	B						5
Biomedical optics			C					3
BioMEMS		B	C			F		2
Biomolecular structure and mechanics	A		C		E			4
Biophysics: physics of the cell	A		C	D		F		3
Biophysics: physics of biological systems	A		C			F		4
Cancer biology I, II				D				10
Computational cell biology				D	E			4
Computational motor control	A				E		G	4
Controlling behavior in animals and robots	A						G	4
Deep learning					E			4
Flexible bioelectronics		B				F	G	4
Fracture mechanics	A							3
Frontiers in chemical biology			C	D		F		3
Fundamentals of biophotonics			C			F		3
Fundamentals of biosensors and electronic biochips		B	C			F		3
Fundamentals of microfabrication		B				F		3
Fundamentals of neuroengineering		B					G	4
Genomics and bioinformatics				D	E			4
Hydrodynamics	A							5
Image analysis and pattern recognition			C		E	F		4
Imaging optics		B						3
Immunoengineering					D	F		4
Immunology					D			5
Infection biology				D				5
In silico neuroscience					E		G	4
Interfaces in biology and nanoscience			C			F		4
Lab immersion I, II								16
Lab immersion III (semester project)								12
Lab immersion academic (outside EPFL)								22
Lab immersion in industry								22
Lab methods: animal experimentation	A	B		D			G	2
Lab methods: bioactive compounds screening				D				2
Lab methods: biosafety	A	B	C	D		F	G	2
Lab methods: flow cytometry				D				2
Lab methods: histology		B	D				G	2
Lab methods: proteomics		B	D					2
Micro- nano-robotics	A							3
Modèles stochastiques pour les communications					E			6
Molecular endocrinology				D				4
Nanomaterials		B	C			F		3
Nanobiotechnology and biophysics	A	B				F		3
Neuroscience for engineers							G	4
Neuroengineering of vision		B					G	4
Neuroscience: from molecular mechanisms to disease				D			G	5
Neuroscience: cellular and circuit mechanisms				D			G	5
Neuroscience: behavior and cognition							G	5
New tools & research strategies in personalized health		B	D					4
Numerical methods in biomechanics	A							3
Nutrition: from molecules to health				D				4
Pharmacology and pharmacokinetics		B	D					4
Principles and applications of systems biology				D	E			3
Randomness and information in biological data					E			4
Seminar in physiology and instrumentation	A	B				F		2
Sensorimotor neuroprosthetics	A	B					G	4
Sensors in medical instrumentation		B				F		3
Signal processing for functional brain imaging			C		E		G	3
Single cell biology				D				4
Statistical physics of biomacromolecules	A							4
Stem cell biology and technology		B	D					3
Structural mechanics	A	B						4
Synthetic biology				D	E			4
Tissue engineering		B	D					4

School of Life Sciences
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