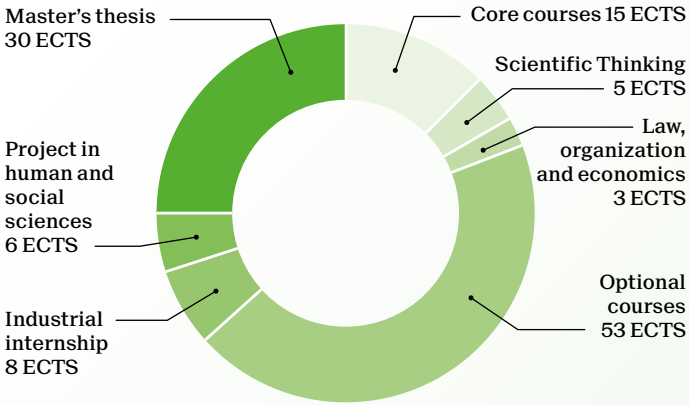


Master of Science in LIFE SCIENCES ENGINEERING

2-year program - 120 ECTS



Specializations

Validation of a Specialization is optional and requires at least 30 ECTS credits with the same label (A, B, C, D, E, F, G) from the "Options".

- 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

Students can also opt for a 30 ECTS Minor.

Minors recommended with this Master:

- Biocomputing
- Biomedical Technologies
- Biotechnologies
- Computational Neurosciences
- Management, Technology, Entrepreneurship
- Neuroprosthetics

	Specializations							Credits
Core courses								15
Applied biostatistics	A	B	C	D	E	F	G	5
Applied data analysis	A	B	C	D	E	F	G	6
Applied probability and stochastic processes			C	E				4
Biomedical signal processing		B	C	E	F			6
Biomicroscopy I	A	B	C	D			G	3
Biomicroscopy II	A	B	C	D			G	4
Data analysis and model classification					E	F		4
Dynamical system theory for engineers								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			G	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
Scientific project design in cell and developmental biology								5
Scientific literature analysis in computational molecular biology								5
Scientific literature analysis in Neuroscience								5
Scientific project design in Drug Discovery								5
Scientific project design in Integrative Neurosciences								5
Scientific project design in regenerative medicine and diagnostics								5
Scientific project design in Synthetic Biology (iGEM)								5
Scientific project design in Translational Neurosciences								5
Scientific project design in Translational Oncology								5

	Specializations							Credits
Law, organization and economics								3
Economics of innovation in the biomedical industry								3
Introduction au droit et à l'éthique								3
Other approved course from the minor in Management, Technology, Entrepreneurship								3
Optional courses								53
Advanced bioengineering methods laboratory	A	C	D		F	G		4
Analog circuits for biochip		B	C			F		3
Analysis and modelling of locomotion	A	B					G	4
Applied biostatistics								5
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 I, II	A	C			F			7
Brain computer interaction					E		G	4
Cancer biology I, II				D				10
Chemical biology			C	D	F			3
Computational cell biology								4
Computational motor control	A				E		G	4
Controlling behavior in animals and robots	A						G	4
Flexible bioelectronics		B				F		3
Fundamentals of biophotonics			C			F		3
Fundamentals of biosensors and electronic biochips		B	C			F		3
Fundamentals of neuroengineering		B					G	4
Genomics and bioinformatics				D	E			4
Image analysis and pattern recognition			C		E	F		4
Immunology				D				5
Infection biology				D				5
In silico neuroscience					E		G	4
Introduction à l'informatique visuelle					E		G	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	3
Lab methods: flow cytometry				D				2
Lab methods: histology		B		D			G	2
Lab methods: proteomics		B		D				2
Modèles stochastiques pour les communications					E			6
Molecular endocrinology				D				4
Nanomaterials		B	C			F		3
Nanobiotechnology and biophysics	A	B				F		3
Neuroengineering of vision		B					G	4
Neuroscience I: molecules & neurodegeneration				D			G	5
Neuroscience II: cellular mechanisms				D			G	5
Neuroscience III: behavior & cognition				D			G	5
New tools & research strategies in personalized health		B		D				4
Nutrition: from molecules to health				D				4
Pharmacology and pharmacokinetics		B		D				5
Principles and applications of systems biology				D	E			3
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			D				4
Stem cell biology and technology		B		D				3
Structural mechanics (for SV)	A	B						4
Technologie des microstructures I		B				F		3
Tissue engineering		B						4
Unsupervised & reinforcement learning in neural networks					E		G	4

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