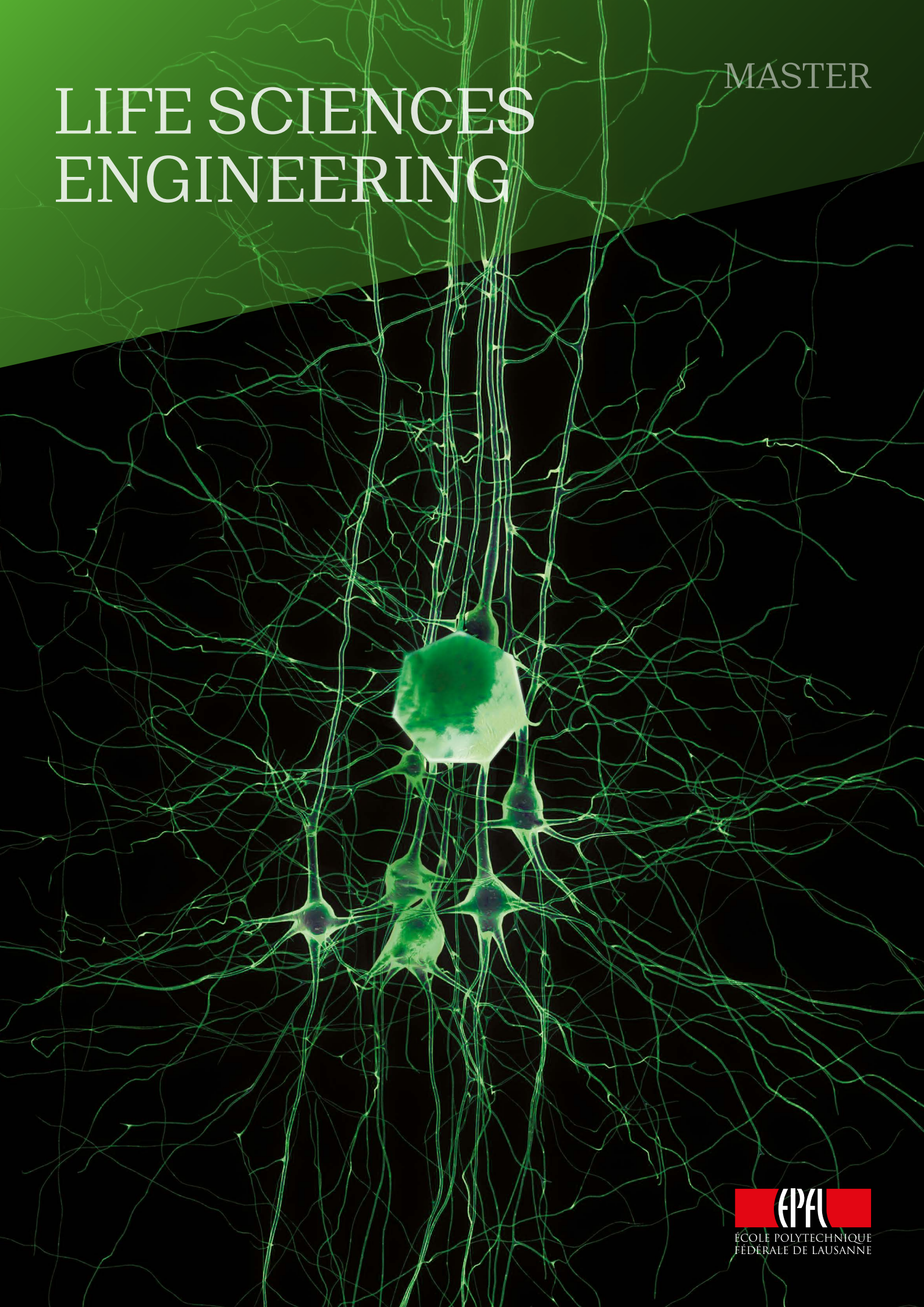


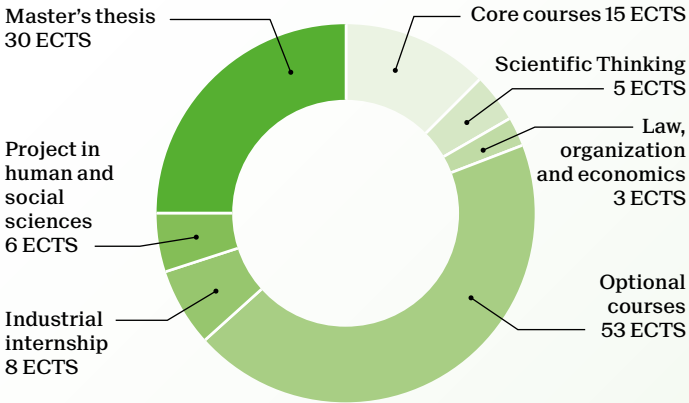
# LIFE SCIENCES ENGINEERING

MASTER



# 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
<b>Core courses</b>		<b>15</b>
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
<b>Scientific thinking</b>		<b>5</b>
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
<b>Law, organization and economics</b>		<b>3</b>
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
<b>Optional courses</b>		<b>53</b>
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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