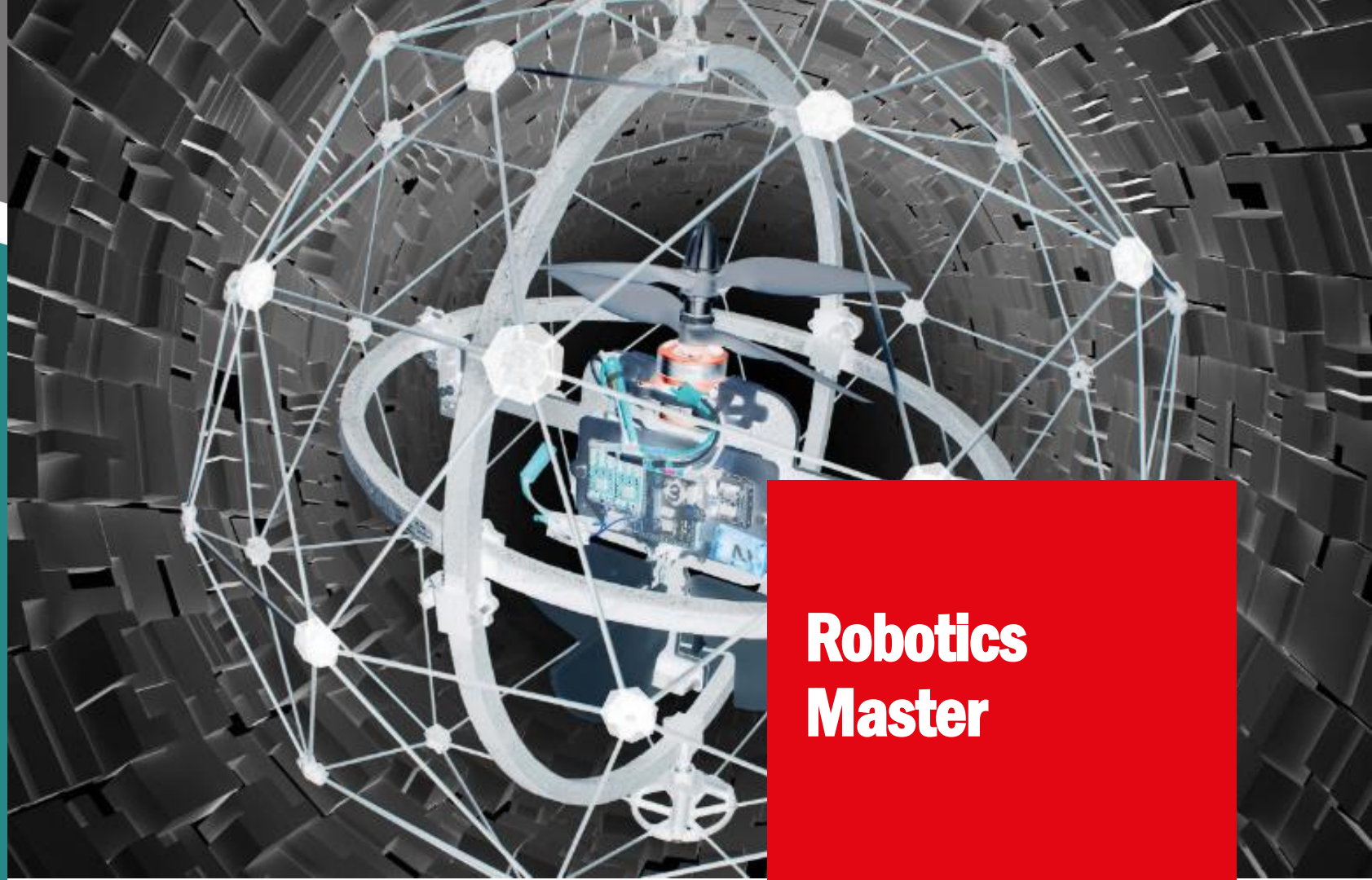
EPFL

mt

microtechnique
microengineering
section



Robotics Master

Faculté des Sciences
et Techniques
de l'Ingénieur (STI)

Welcome to Robotics !

Download the Presentation

QR

Prof. Francesco Mondada
Conseiller d'étude
Master Robotique

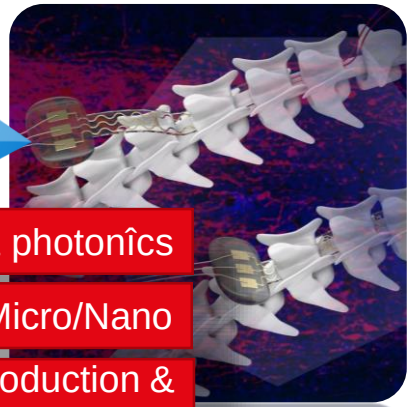
Prof. Christophe Moser
Directeur de section
Microtechnique

Bachelor Microtechnique

Robotics master

- Industrial
- Mobile
- Medical

Microengineering master



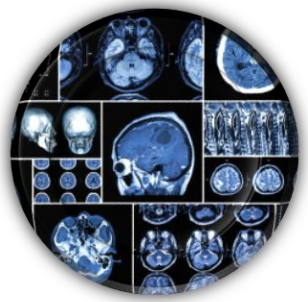
- Optics & photonîcs
- Micro/Nano
- Advanced production & manufacturing

Minors

Optics & Photonics

Biomedical Technologies

Imaging



Other EPFL BaS programs

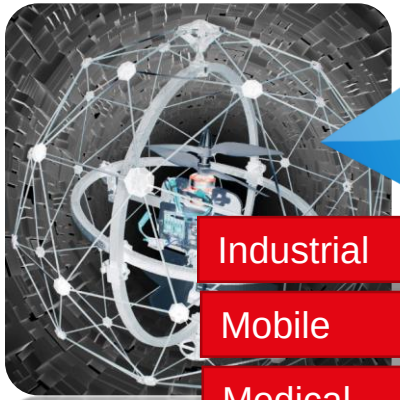
4.50 average

No mandatory prerequisit rules

Recommended background:

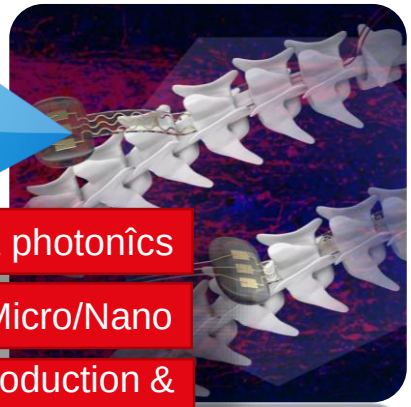
- Electronics
- Programming
- Mechanical design
- Microfab

Robotics master



- Industrial
- Mobile
- Medical

Microengineering master



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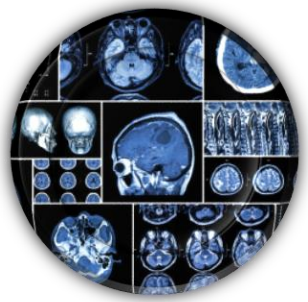

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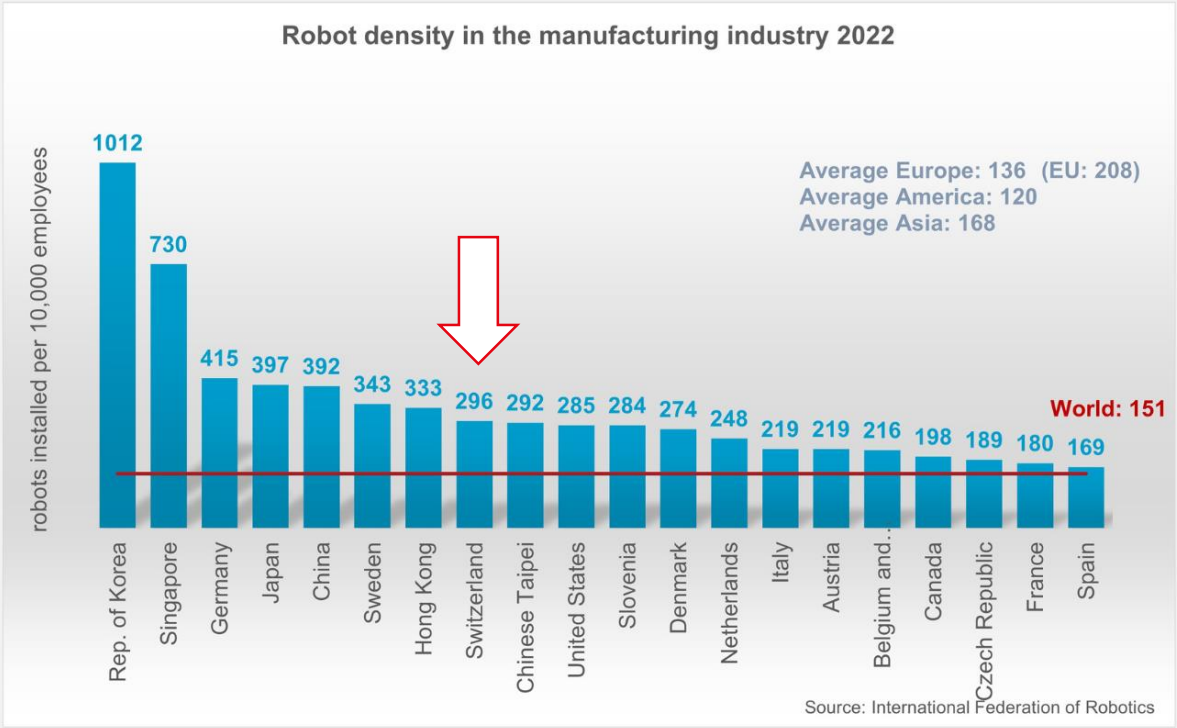
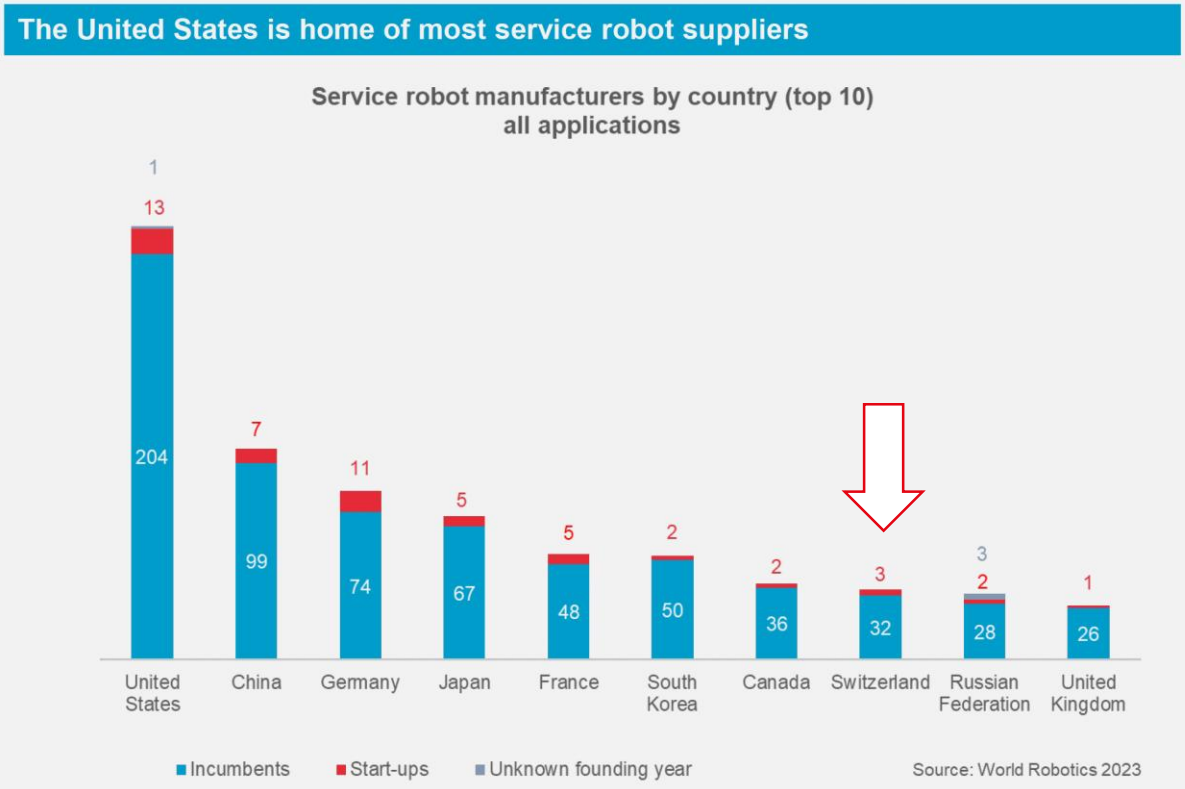
Robotics

Ce n’est pas un slogan marketing, c’est un fait: en robotique, la Suisse est championne du monde. «Si l’on prend le top 20 des labos dans le monde, pratiquement un quart sont en Suisse, alors que nous n’avons que huit millions d’habitants», confirme Aude Billard,

Switzerland in top 10 in automatisation



Top 10 in # of manufacturers of service robots



Worldwide recognition

EduRank

28. Federal Institute of Technology Lausanne

Switzerland | Lausanne

For Engineering

#4 in Europe

#1 in Switzerland

Enrollment 12,576

EPFL

8. Federal Institute of Technology Lausanne

Switzerland | Lausanne

For Robotics

#1 in Europe

#1 in Switzerland

EPFL

https://edurank.org/engineering/nanotechnology/

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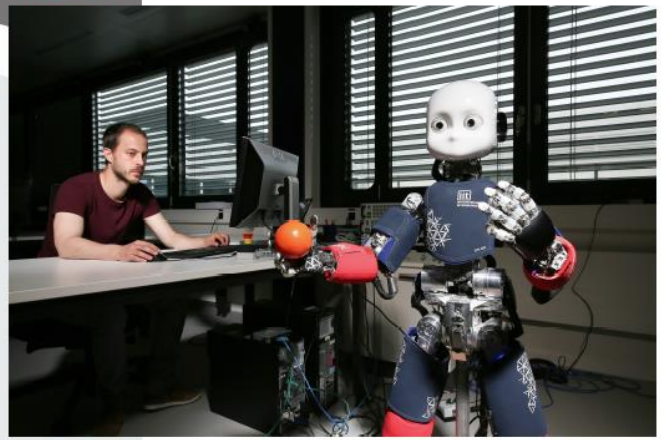
Robotics

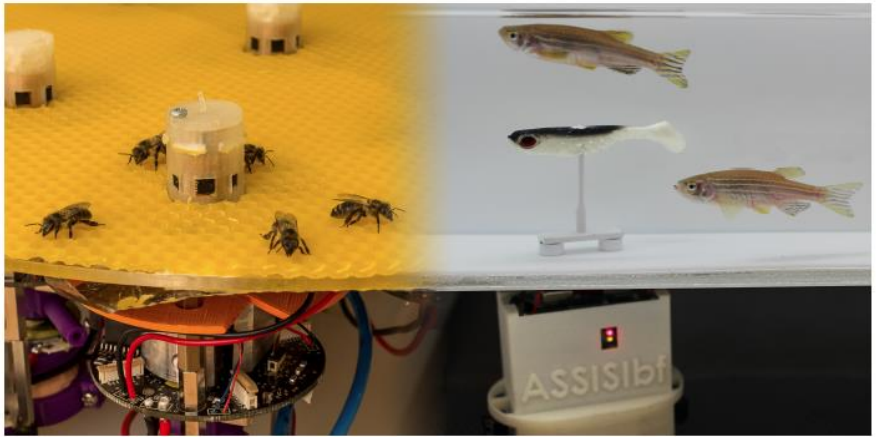


Prof. Aude Billard

Prof. Dario Floreano

Prof. Auke Ijspeert

Prof. Silvestro Micera



Prof. Francesco Mondada

EPFL mt microtechnique microengineering section

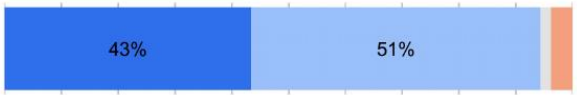
Diversité (écoles de provenance de nos candidats externes)

Technische Universität München	Allemagne
Technische Universität Wien	Autriche
Université Catholique de Louvain	Belgique
McGill University, Montreal	Canada
University of British Columbia, Vancouver	Canada
University of Toronto	Canada
University of Waterloo	Canada
Shanghai Jiao Tong University	Chine
The Hong Kong University of Science and Technology	Chine
Tsinghua University, Beijing	Chine
Universitat Politècnica de Catalunya, Barcelona	Espagne
Cornell University, Ithaca	Etats-Unis
Harvard University, Cambridge	Etats-Unis
University of California, Santa Barbara	Etats-Unis
University of Illinois at Urbana-Champaign	Etats-Unis
Ecole Polytechnique, Palaiseau	France
National Technical University of Athens	Grèce
Indian Institute of Technology Delhi	Inde
Indian Institute of Technology Kanpur	Inde
Indian Institute of Technology Madras	Inde
Politecnico di Milano	Italie
Politecnico di Torino	Italie
Università degli Studi di Roma "La Sapienza"	Italie
Delft University of Technology	Pays-Bas
Imperial College London	Royaume-Uni
University of Edinburgh	Royaume-Uni
Nanyang Technological University	Singapour
National University of Singapore	Singapour
Bogazici University, Istanbul	Turquie

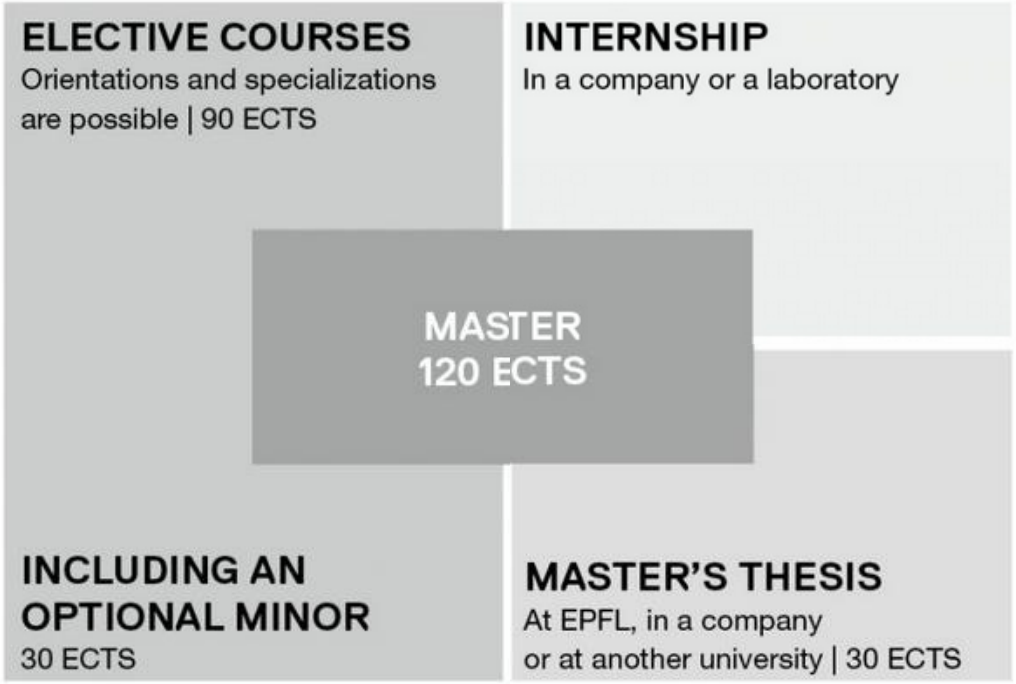
Alumni careers

Careers after EPFL's MA Program in Robotics

Quality

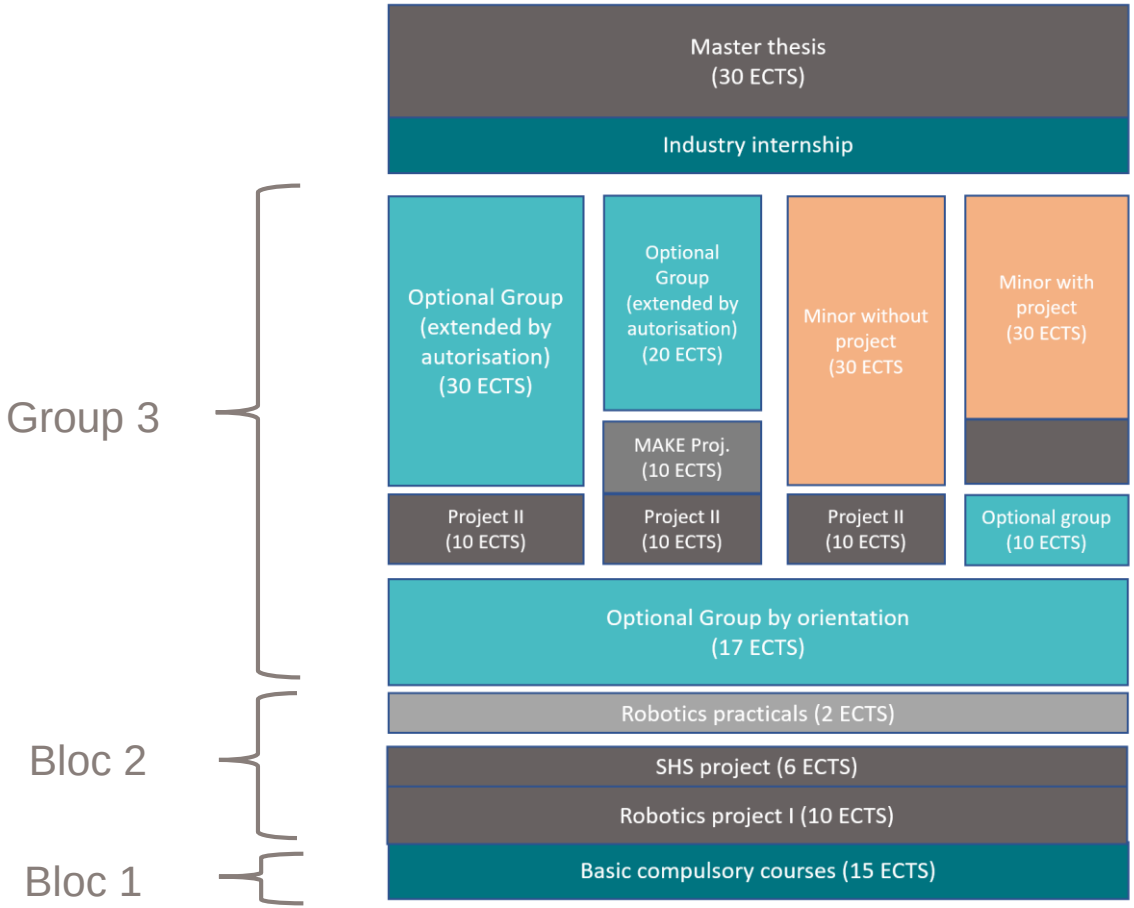
8.Please give your general appreciation and comments on the Robotics Master	
8.1) Overall, I find the Robotics Master of high quality	

Master program structure

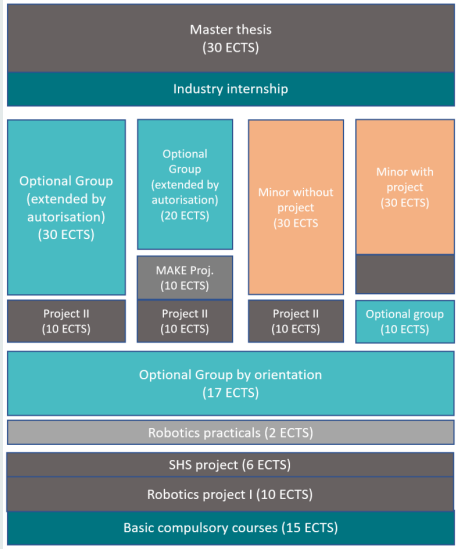


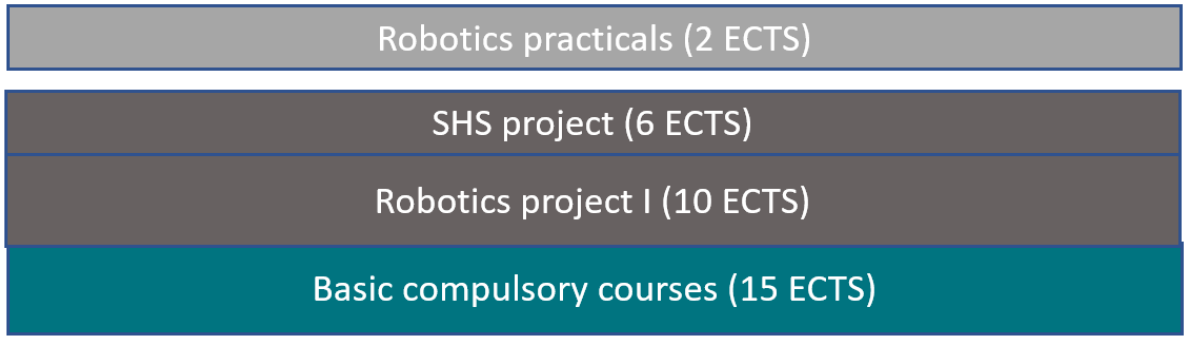
https://www.epfl.ch/education/master/study-programs-structure/

Master Program structure



Structure


Master thesis
(30 ECTS)
Industry internship
Optional Group (extended by autorisation) (30 ECTS)
Optional Group (extended by autorisation) (20 ECTS)
MAKE Proj. (10 ECTS)
Minor without project (30 ECTS
Minor with project (30 ECTS)
Project II (10 ECTS)
Project II (10 ECTS)
Project II (10 ECTS)
Optional group (10 ECTS)
Optional Group by orientation (17 ECTS)
Robotics practicals (2 ECTS)
SHS project (6 ECTS)
Robotics project I (10 ECTS)
Basic compulsory courses (15 ECTS)


Robotics practicals (2 ECTS)
SHS project (6 ECTS)
Robotics project I (10 ECTS)
Basic compulsory courses (15 ECTS)

Compulsory courses

Foundations :

- Basics of Mobile Robotics (4 ECTS; Mondada) – fall
- Basics of robotics for manipulation (3 ECTS; Bouri) – fall

Algorithms and Methods for Robotics :

- Machine learning I (4 ECTS; Billard) – fall
- Model Predictive Control (4 ECTS; Jones) – fall

Practicals:

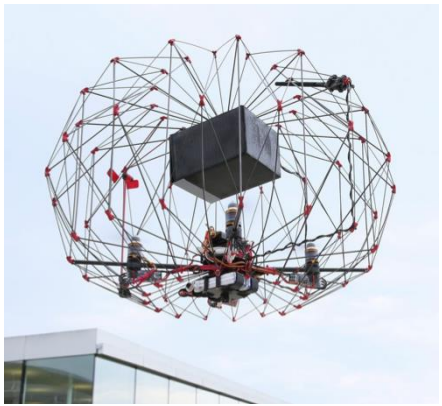
- Robotics Practicals (2 ECTS; Mondada + all) - spring

Orientations

17 optional credits chosen among the optional courses of the chosen orientation, then free choice in robotics options.

Industrial Robotics

Medical Robotics

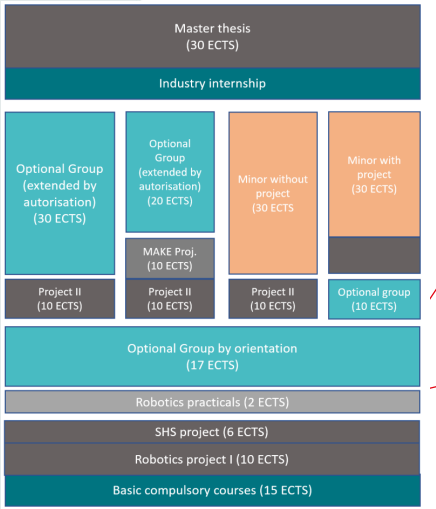


Mobile robotics

Orientations

Students must choose 17 ECTS of optional courses in one of these three orientations:

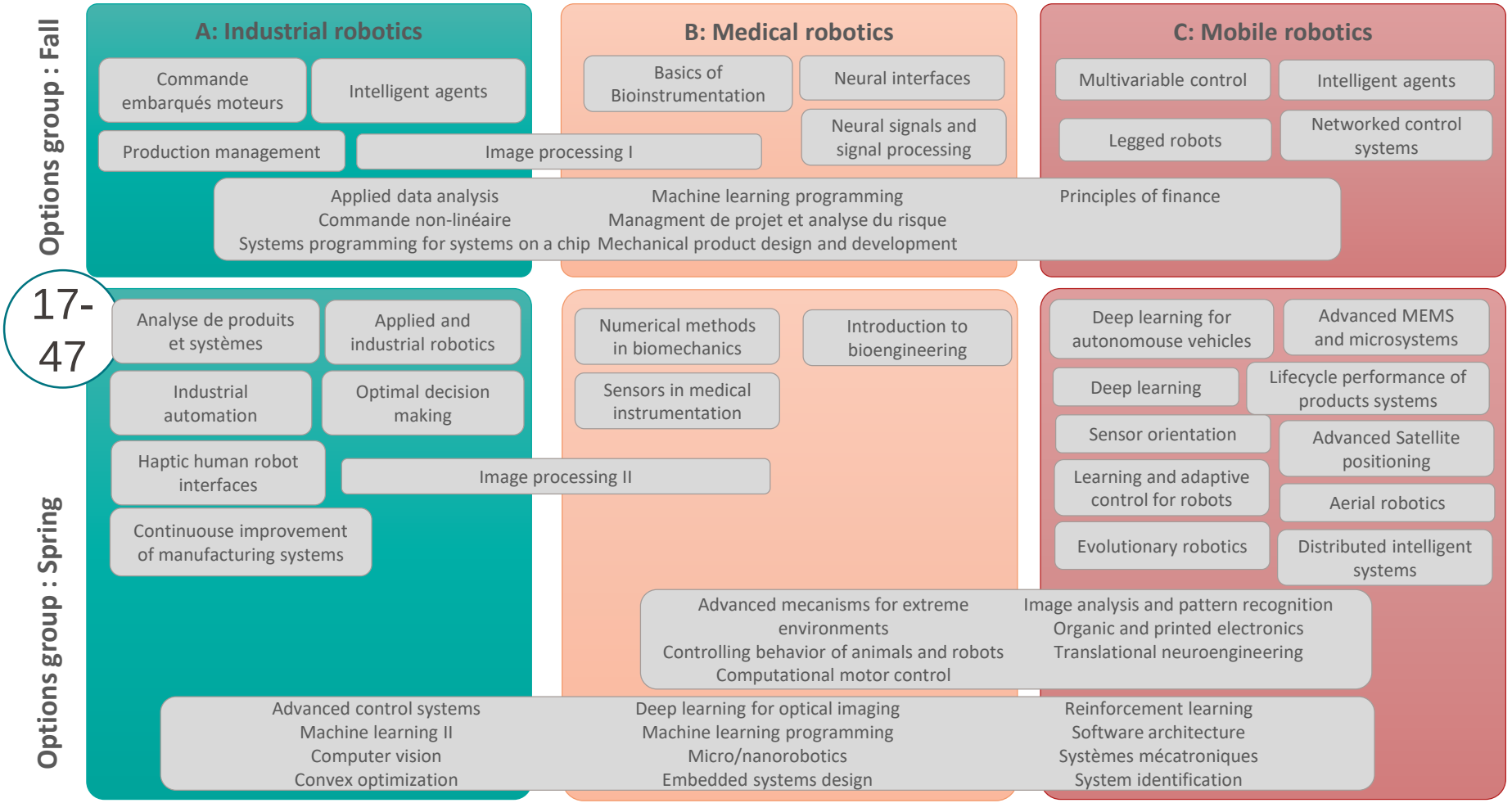
A Industrial robotics
B Medical robotics
C Mobile robotics



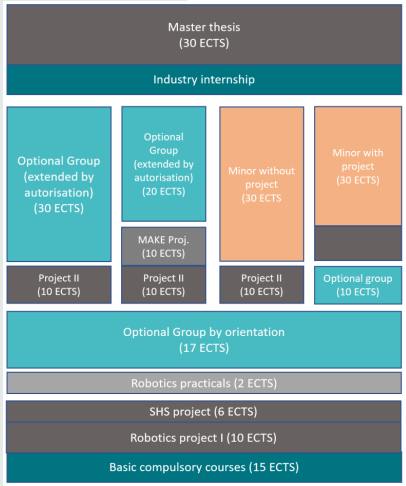
Groupe à options
Grand choix de cours
(17 ECTS)

Optional courses and orientation	A	B	C	59
Advanced control systems	A	B	C	3
Advanced machine learning	A	B	C	4
Advanced MEMS & microsystems			C	3
Advanced satellite positionning			C	4
Analyse de produits et systèmes	A			2
Analysis and modeling of locomotion		B	C	4
Biomaterials		B		4
Commande embarquée de moteurs	A			2
Computational motor control		B	C	4
Computer vision	A	B	C	4
Conception mécanique intégrée	A			3
Continuous improvement of manufacturing systems	A			4
Controlling behavior in animal and robots		B	C	4
Deep learning	A	B	C	4
Distributed intelligent systems			C	5
Embedded systems	A	B	C	4
Evolutionary robotics			C	3
Flexible bioelectronics		B		4
Flying robots			C	4
Fundamentals of computer aided manufacturing	A			5
Fundamentals of neuroengineering			C	4
Haptic human robot interfaces	A			3
How technology shapes the workplace of the future	A	B	C	3
Image analysis and pattern recognition		B	C	4
Image processing I		B		3
Image processing II		B		3
Industrial automation	A			3
Industry dynamics, models & trends	A			4
Intelligent agents	A		C	6
Interdisciplinary project				10
				4
				3
				2
				5
				3
				4
				3
				3
				4
				2
				5
Real-time embedded systems	A	B	C	4
Robotique industrielle et appliquée	A			2
Sensorimotor neuroprosthetics		B		4
Sensor orientation			C	4
Sensors in medical instrumentation		B		3
Signal processing for functional brain imaging		B		3
System identification	A	B	C	3
Systèmes mécatroniques	A	B	C	5

Master in Robotics - Orientations

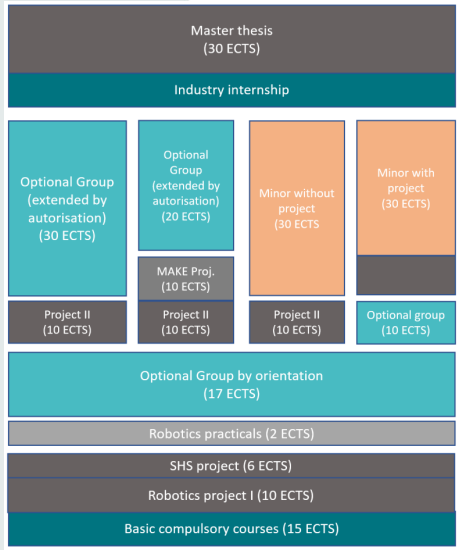


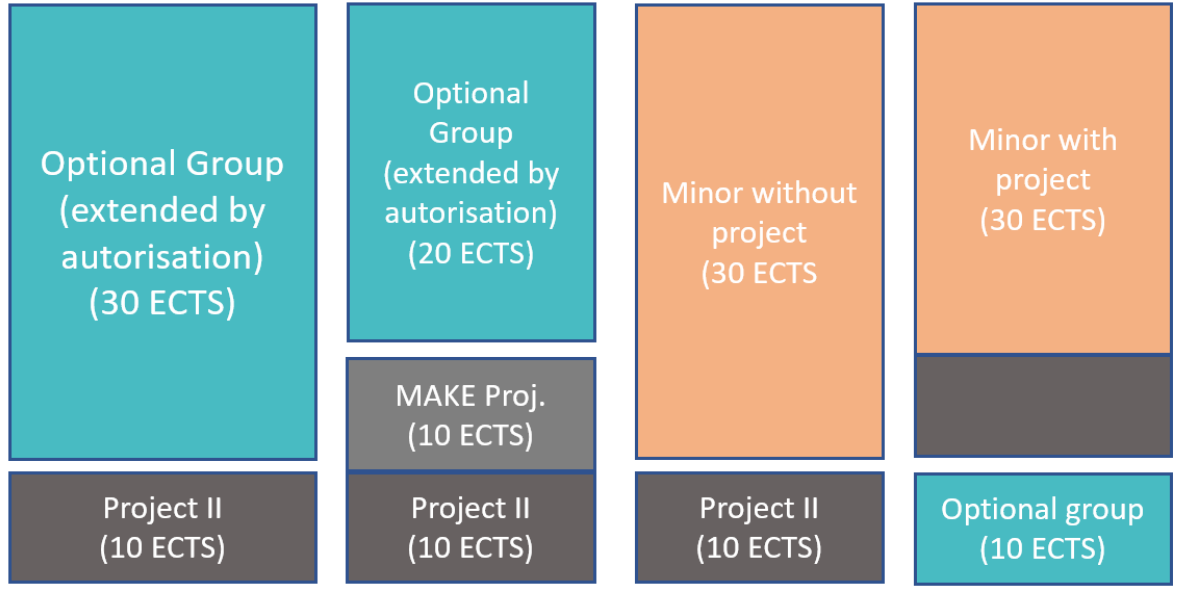
Orientation courses examples



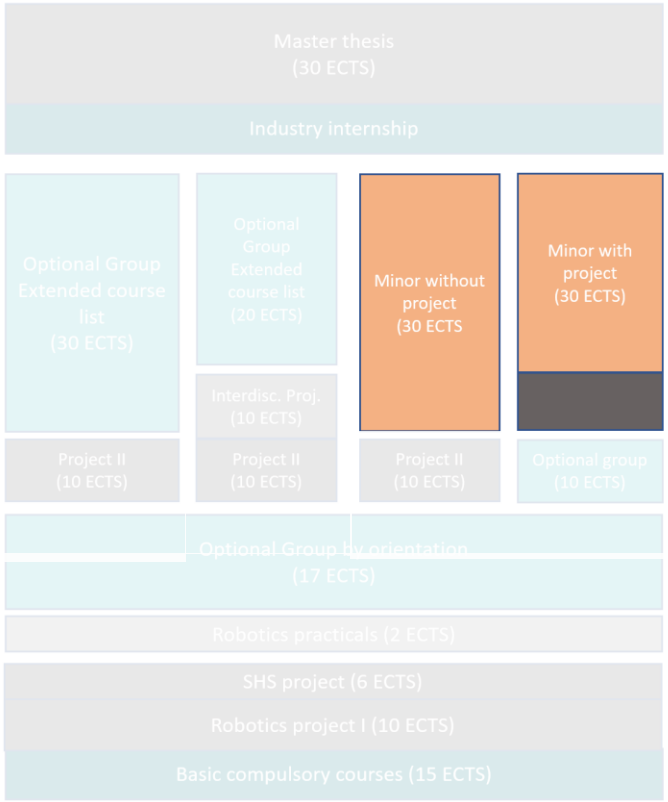
2021-2022	ROBOTICS - Options		
Code	Matières	Enseignants	Crédits
MICRO-502	Aerial robotics	Floreano	3
MICRO-515	Evolutionary robotics	Floreano	3
MICRO-570	Advanced machine learning	Billard	4
EE-559	Deep learning	Fleuret	4
MICRO-514	Flexible bioelectronics	Lacour S.	4
EE-451	Image analysis and pattern recognition	Thiran J.-P.	4
MICRO-462	Learning and adaptative control for robots	Billard	4
MICRO-455	Applied machine learning	Billard	4
MICRO-553	Haptic human robot interfaces	Bouri	3
MICRO-401	Machine learning programming	Billard	2
BIOENG-404	Analysis and modelling of locomotion	Aminian/Ijspeert/Courtine	4
BIOENG-456	Controlling behavior in animals and robots	Ramdya	4
CIVIL-459	Deep learning for autonomous vehicles	Alexandre Alahi	6
ENG-466	Distributed intelligent systems	Martinoli	5
CS-487	Industrial automation	Tournier/Sommer	3
MICRO-507	Legged robots	Ijspeert	3
ENV-548	Sensor orientation	Skaloud	4

Free options





Minors...


Master thesis
(30 ECTS)
Industry internship
Optional Group Extended course list
(30 ECTS)
Optional Group Extended course list
(20 ECTS)
Minor without project
(30 ECTS
Minor with project
(30 ECTS)
Interdisc. Proj.
(10 ECTS)
Project II
(10 ECTS)
Project II
(10 ECTS)
Project II
(10 ECTS)
Optional group
(10 ECTS)
Optional Group by orientation
(17 ECTS)
Robotics practicals (2 ECTS)
SHS project (6 ECTS)
Robotics project I (10 ECTS)
Basic compulsory courses (15 ECTS)

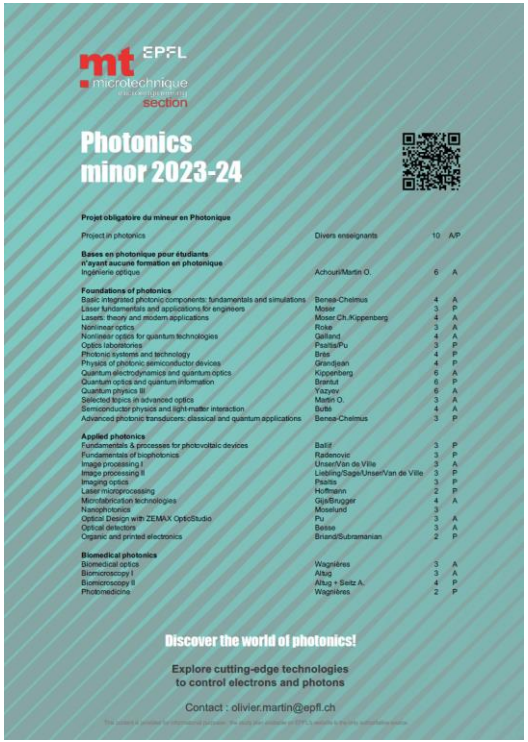
Recommended and possible Minors

Computer science	Discipl.	IN	Hazboun E.	r
Energy	Interdiscipl.	GM	Maréchal F.	r
Imaging	Interdiscipl.	MT	Sage Daniel	r
Engineering for sustainability	Interdiscipl.	SIE	Gilliéron P.Y. , Leterrier	r
Neuro-X	Discipl.	NX	Hummel F, Micera S.	r
Photonics	Interdiscipl.	MT	Martin O.	r
Physics of living systems	Interdiscipl.	SV	Persat A.	r
Quantum science and engineering	Discipl.	SIQ	Macris N. et Klinke H.	r
Biomedical technologies	Interdiscipl.	MT	Guiducci C.	r
Spacial technologies	Interdiscipl.	EL	Kneib J.-P.	r
Computational science and engineering	Discipl.	MA	Pouchon O.	c
Data and internet of things	Interdiscipl.	EL	Atienza D.	c
Technology management and entrepreneurship	Interdiscipl.	MTE	de Rassenfosse G.	c
Architecture	Discipl.	AR	Kochnitzky Palluel L.	c
Computational Biology	Interdiscipl.	IN	Salathé M.	c
Biotechnology	Interdiscipl.	CGC	Pick H.	c
Chemistry and chemical engineering	Discipl.	CGC	Marendaz J.-L.	c
Cyber security	Discipl.	IN	Hazboun E.	c
Data science	Discipl.	SC	Hazboun E.	c
Integrated Design, Architecture and Sustainability (IDEAS)	Interdiscipl.	AR	Andersen M., Rey E.	c
Territories in transformation and climate	Interdiscipl.	AR	Joost St.	c
Civil engineering	Discipl.	GC	Turberg P.	c
Electrical and electronic engineering	Discipl.	EL	Gay-Balmaz Ph.	c
Mechanical engineering	Discipl.	GM	Prenleloup A.	c
Systems Engineering	Interdiscipl.	MTE	Weber Th.	c
Life sciences engineering	Discipl.	SV	Grisoni B.	c
Financial engineering	Discipl.	IF	Fahlenbrach R.	c
Mathematics	Discipl.	MA	Pouchon O.	c
Physics	Discipl.	PH	Mari D.	c
Materials science and engineering	Discipl.	MX	Marselli B.	c
Environmental sciences and engineering	Discipl.	SIE	Gilliéron P.-Y	c
Statistics	Discipl.	MA	Mhalla L.	c
Communication systems	Discipl.	SC	Hazboun E.	c

r Recommanded in the study plans

c Choice of the courses with the advice of the initiating section and the person in charge of the minor

Minors administrated by our section



EPFL mt microtechnique microengineering section

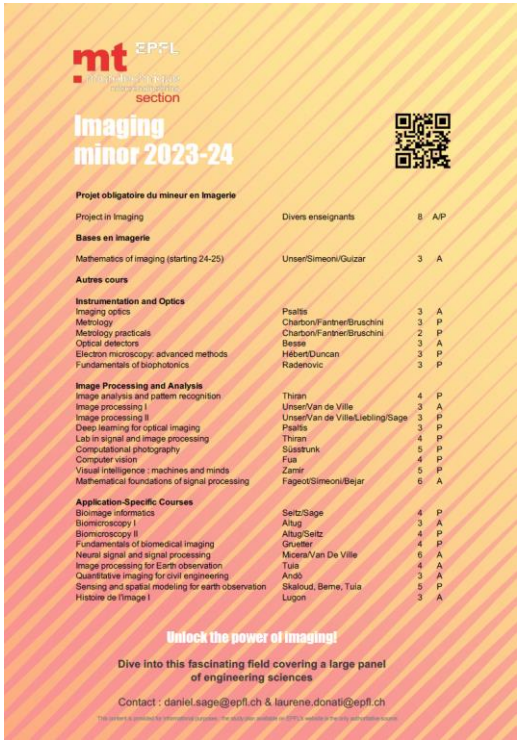
Photonics minor 2023-24

Projet obligatoire du mineur en Photonique			
Project in photonics	Divers enseignants	10	A/P
Bases en photonique pour étudiants n'ayant aucune formation en photonique			
Ingénierie optique	Achouri/Martin O.	6	A
Foundations of photonics			
Basic integrated photonic components: fundamentals and simulations	Benea-Chelmus	4	A
Laser fundamentals and applications for engineers	Moser	3	P
Lasers: theory and modern applications	Moser Ch./Kippenberg	4	A
Nonlinear optics	Roke	3	A
Nonlinear optics for quantum technologies	Galland	4	A
Optics laboratories	Psaltis/Pu	3	P
Photonic systems and technology	Brès	4	P
Physics of photonic semiconductor devices	Grandjean	4	P
Quantum electrodynamics and quantum optics	Kippenberg	6	A
Quantum optics and quantum information	Beaniut	6	P
Quantum physics III	Yazyev	6	A
Selected topics in advanced optics	Martin O.	3	A
Semiconductor physics and light-matter interaction	Buttè	4	A
Advanced photonic transducers: classical and quantum applications	Benea-Chelmus	3	P
Applied photonics			
Fundamentals & processes for photovoltaic devices	Ballif	3	P
Fundamentals of biophotonics	Radenovic	3	P
Image processing I	Unser/Van de Ville	3	A
Image processing II	Liebling/Sage/Unser/Van de Ville	3	P
Imaging optics	Psaltis	3	P
Laser microprocessing	Hoffmann	2	P
Microfabrication technologies	Gijs/Brugger	4	A
Nanophotonics	Moselund	3	
Optical Design with ZEMAX OpticStudio	Pu	3	A
Optical detectors	Beiise	3	A
Organic and printed electronics	Briand/Subramanian	2	P
Biomedical photonics			
Biomedical optics	Wagnières	3	A
Biomicroscopy I	Altug	3	A
Biomicroscopy II	Altug + Seitz A.	4	P
Photomedicine	Wagnières	2	P

Discover the world of photonics!

Explore cutting-edge technologies to control electrons and photons

Contact : olivier.martin@epfl.ch



EPFL mt microtechnique microengineering section

Imaging minor 2023-24

Projet obligatoire du mineur en Imagerie			
Project in Imaging	Divers enseignants	8	A/P
Bases en imagerie			
Mathematics of imaging (starting 24-25)	Unser/Simeoni/Guizar	3	A
Autres cours			
Instrumentation and Optics			
Imaging optics	Psaltis	3	A
Metrology	Charbon/Fantner/Bruschini	3	P
Metrology practicals	Charbon/Fantner/Bruschini	2	P
Optical detectors	Besse	3	A
Electron microscopy: advanced methods	Hébert/Duncan	3	P
Fundamentals of biophotonics	Radenovic	3	P
Image Processing and Analysis			
Image analysis and pattern recognition	Thiran	4	P
Image processing I	Unser/Van de Ville	3	A
Image processing II	Unser/Van de Ville/Liebling/Sage	3	P
Deep learning for optical imaging	Psaltis	3	P
Lab in signal and image processing	Thiran	4	P
Computational photography	Süsstrunk	5	P
Computer vision	Fua	4	P
Visual intelligence : machines and minds	Zamir	5	P
Mathematical foundations of signal processing	Fageot/Simeoni/Bejar	6	A
Application-Specific Courses			
Bioimage informatics	Seitz/Sage	4	P
Biomicroscopy I	Altug	3	A
Biomicroscopy II	Altug/Seitz	4	P
Fundamentals of biomedical imaging	Gruetter	4	P
Neural signal and signal processing	Micera/Van De Ville	6	A
Image processing for Earth observation	Tuia	4	A
Quantitative imaging for civil engineering	Andò	3	A
Sensing and spatial modeling for earth observation	Skaloud, Berne, Tuia	5	P
Histoire de l'image I	Lugon	3	A

Unlock the power of imaging!

Dive into this fascinating field covering a large panel of engineering sciences

Contact : daniel.sage@epfl.ch & laurene.donati@epfl.ch

EPFL mt microtechnique microengineering section

Biomedical technologies minor 2023-24

Projet obligatoire du mineur en Technologies biomédicales			
Project in biomedical technologies	Divers enseignants	8	A/P
Bases biomédicales			
Biophysics : physics of the cell	Manley	3	P
Cellular biology and biochemistry for engineers	Zufferey	4	A
Physiologie par systèmes	Roy	4	P
Seminar in physiology and instrumentation	Radenovic	2	A
Autres cours			
Analog circuits for biochip	Carrara/Schmid/Skrivervik	3	P
Applied biomedical signal processing	Lemay	4	A
Bioelectronics and biomedical microelectronics	Schmid	3	A
Bioimage informatics	Sage/Seitz	4	P
Basics in Bioinstrumentation *	Merten	4	A
Computational neurosciences : neuronal dynamics	Gerstner	5	P
Biomechanics of the cardiovascular system	Stergiopulos	3	P
Biomechanics of the musculoskeletal system	Pioletti	5	P
Biomedical optics	Wagnières G.	3	A
Biomicroscopy I	Altug	3	A
Biomicroscopy II	Altug+Seitz A.	4	P
Bio-nano-chip design	Carrara	3	A
Biophysics : physics of biological systems	Rahi Sahand J.	4	A
Fundamentals of biomedical imaging	Gruetter	4	P
Fundamentals of biophotonics	Radenovic A.	3	P
Fundamentals of biosensors and electronic biochips	C. Guiducci	3	A
Ingénierie optique	Achouri/Martin O.	6	A
Light, liquids and interfaces	Roke S.	4	A
Mechanobiology: how mechanics regulate life	Persat/Sakar	3	A
Microfabrication technologies	Brugger/Gijs	4	A
Nanobiotechnology and biophysics	Fletz B.	3	P
Neural interfaces	Lacour	6	A
Neural signals and signal processing	Micera/Van De Ville	6	A
Neuroscience: cellular and circuit mechanisms	Crochet/Petersen	5	A
New tools & research strategies in personalized health	Trono	4	P
Numerical methods in biomechanics	Terrier A.	3	P
Sensors in medical instrumentation	Chételat/Ionescu	3	P
Translational neuroengineering	Blanke/Courtine/Hummel/Micera	6	P

Experience the future of biomedical technologies !

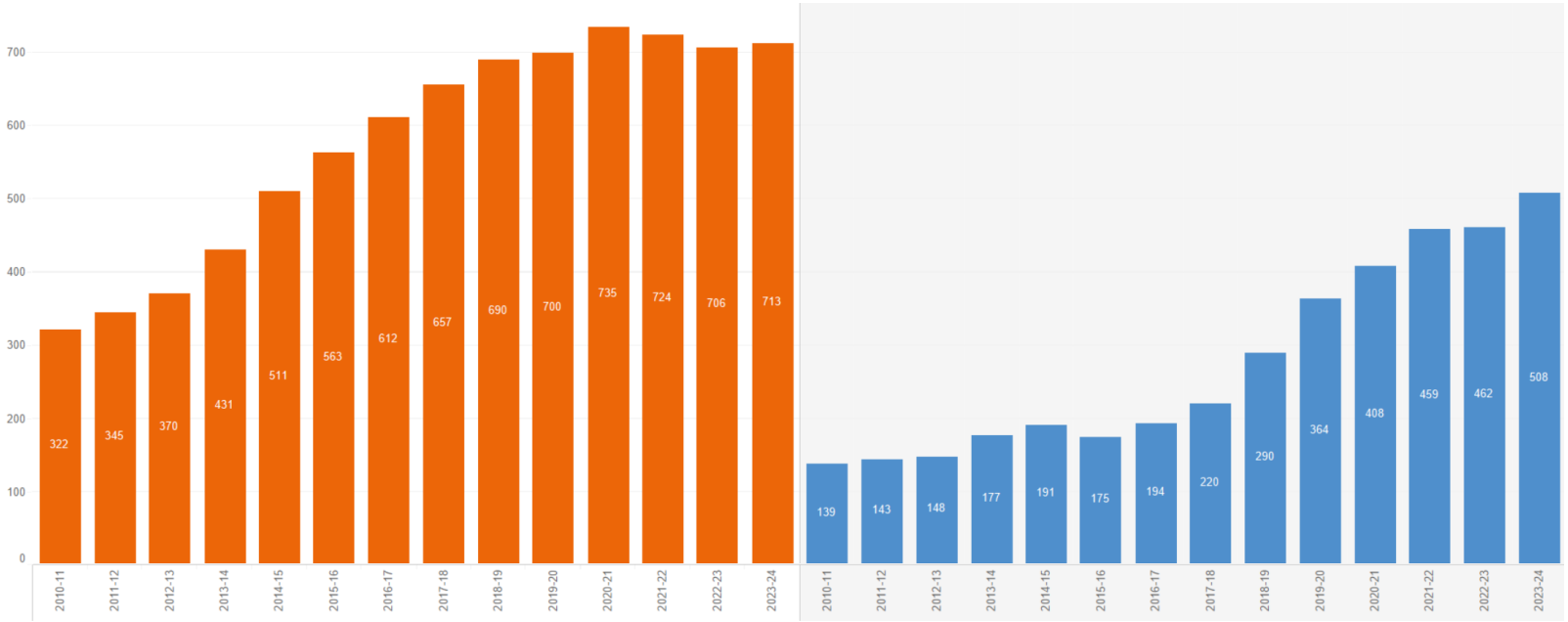
Join this program to transform the way we understand and treat the human body

Contact : carlotta.guiducci@epfl.ch

Successful curricula (>1200 students)

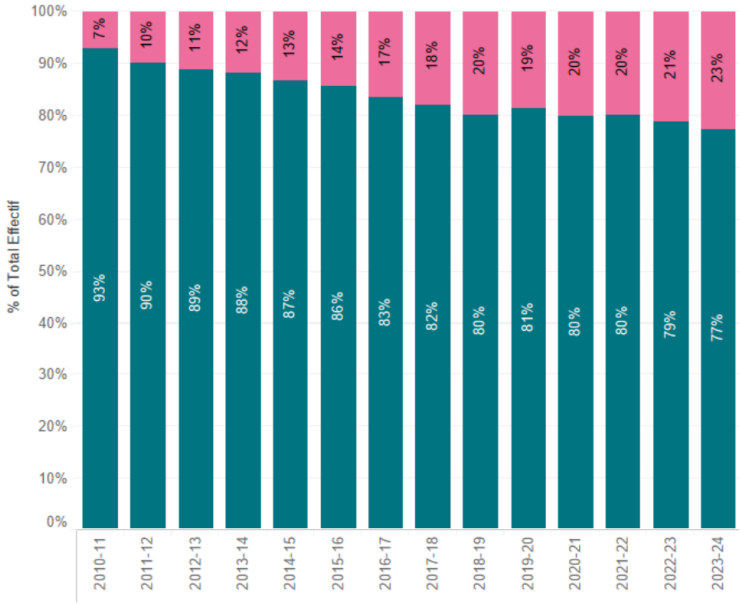
Bachelor

Master
Microengineering & Robotics

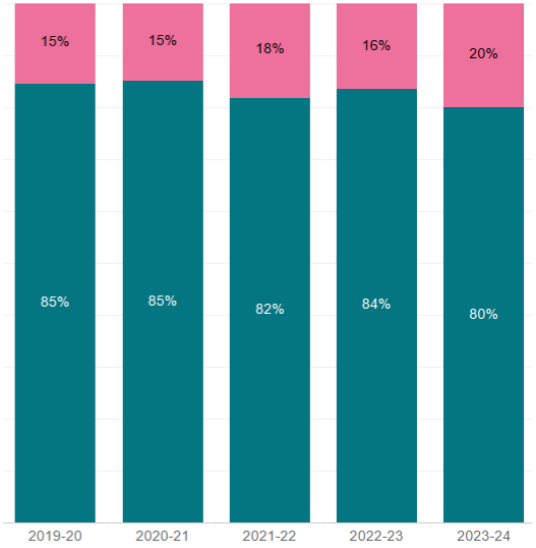


Gender balance

Bachelor



Robotics Master



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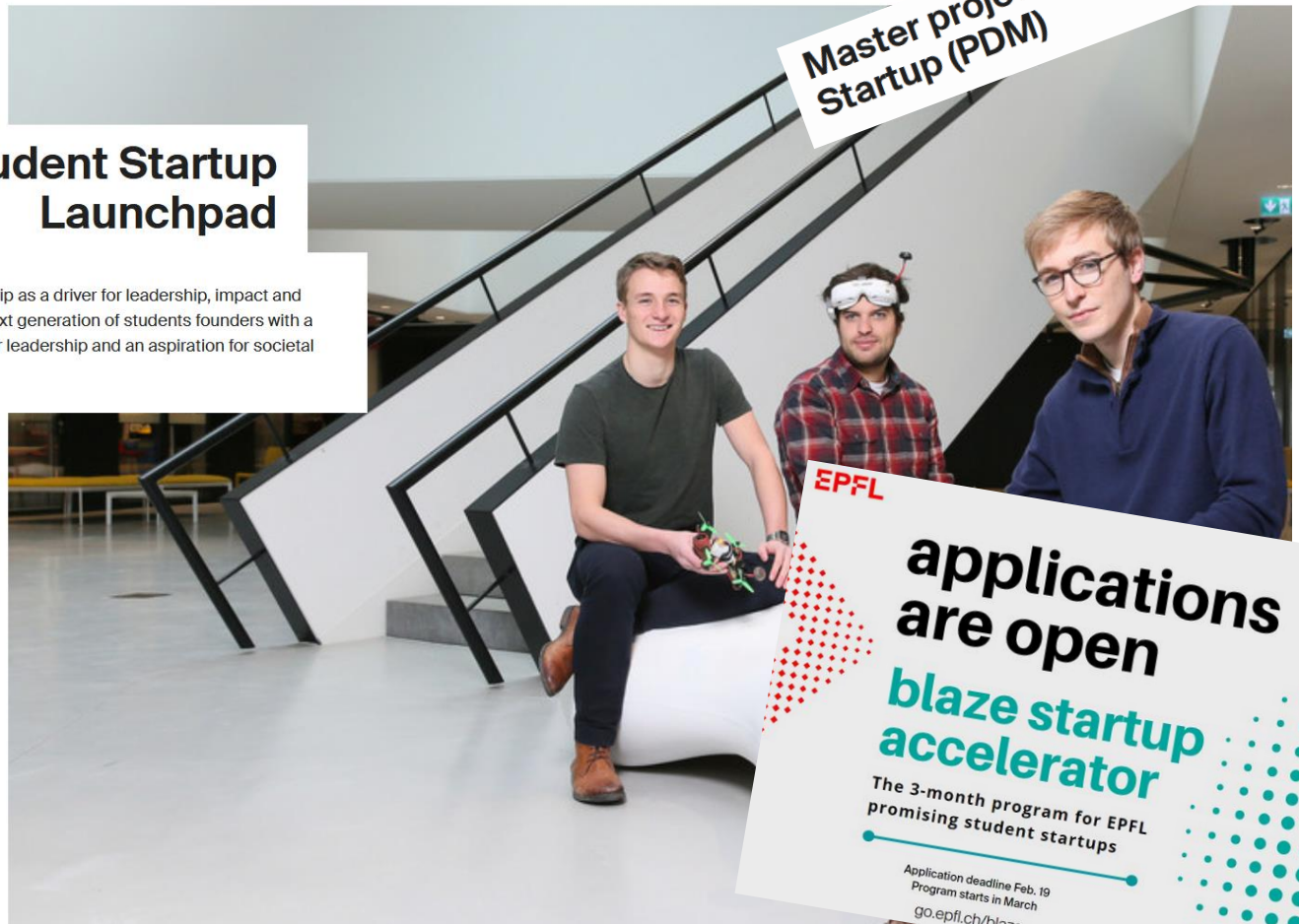
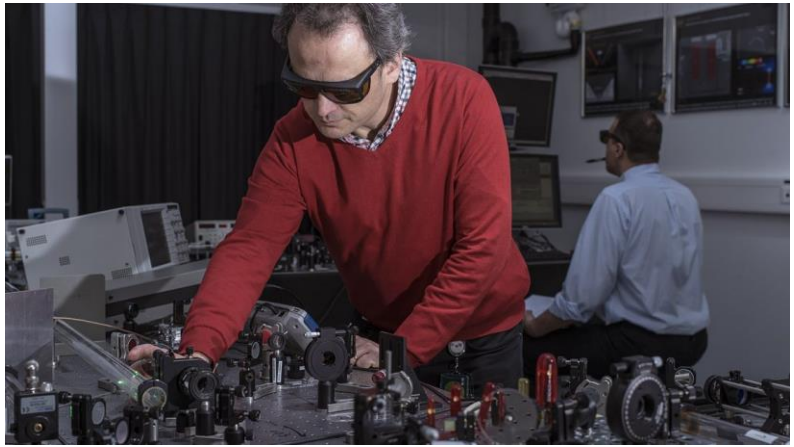
Entrepreneurship !

Student Startup Launchpad

We foster student entrepreneurship as a driver for leadership, impact and innovation. We are building the next generation of students founders with a drive for excellence, an instinct for leadership and an aspiration for societal impact.



Research - IEM to host your projects



IEM covers the following major technical fields:

- Electronic Circuits and Devices
- Micro-manufacturing and Micro- and Nano-technologies
- Robotics
- IoT, Computer & Communication Engineering
- Optics, Photonics and wave engineering
- Machine learning, Information Science and Systems
- Power and Energy

Research in IEM :

- 37 Full Professors / Associate Professors / Tenure-Track Assistant Professors
- 1 SNSF-funded Professor
- 13 Adjunct Professors
- 11 Senior Scientists
- 1 Member of the US National Academy of Engineering
- 1 Member of the American Academy of Arts & Sciences
- 1 Member of the Academia Europaea
- 2 Members of Swiss Academy of Engineering Sciences
- 25 ERC grants : 12 Advanced, 6 Consolidator and 7 Starting grants since 2008

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One Institute on 3 campuses

EPFL iem
institute of electrical and micro engineering

Geneva - Campus Biotech
- Bio- and neuroengineering (Wyss center)
- Human Brain Project
- Center for neuroprosthetics

- 420 staff
- 9 chairs
- 3880 m²

Neuchâtel - Microcity
- Microengineering and nanotechnologies

- 230 staff
- 11 chairs
- 8035 m²

Short Movie to learn more

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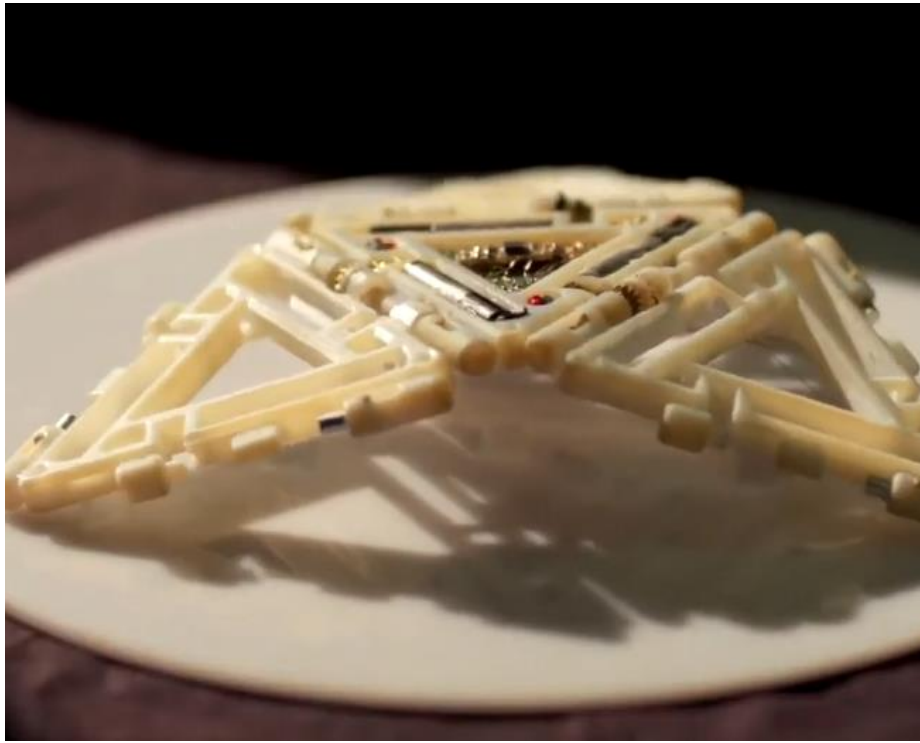
Faculté des Sciences
et Techniques
de l'Ingénieur (STI)

Student Testimony

Sébastien de Rivaz
about the Robotics Master

Student Testimony

Arwen Blanche Giraud
about the Robotics Master



Alumni Testimonies

Adrien Briod
Founder and CTO
Master Microtechnique terminé en 2009
Thès doctorat EPFL 2013

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We wish you a successful continuation of your Bachelor studies and hope that you will make the right choice for your Master !