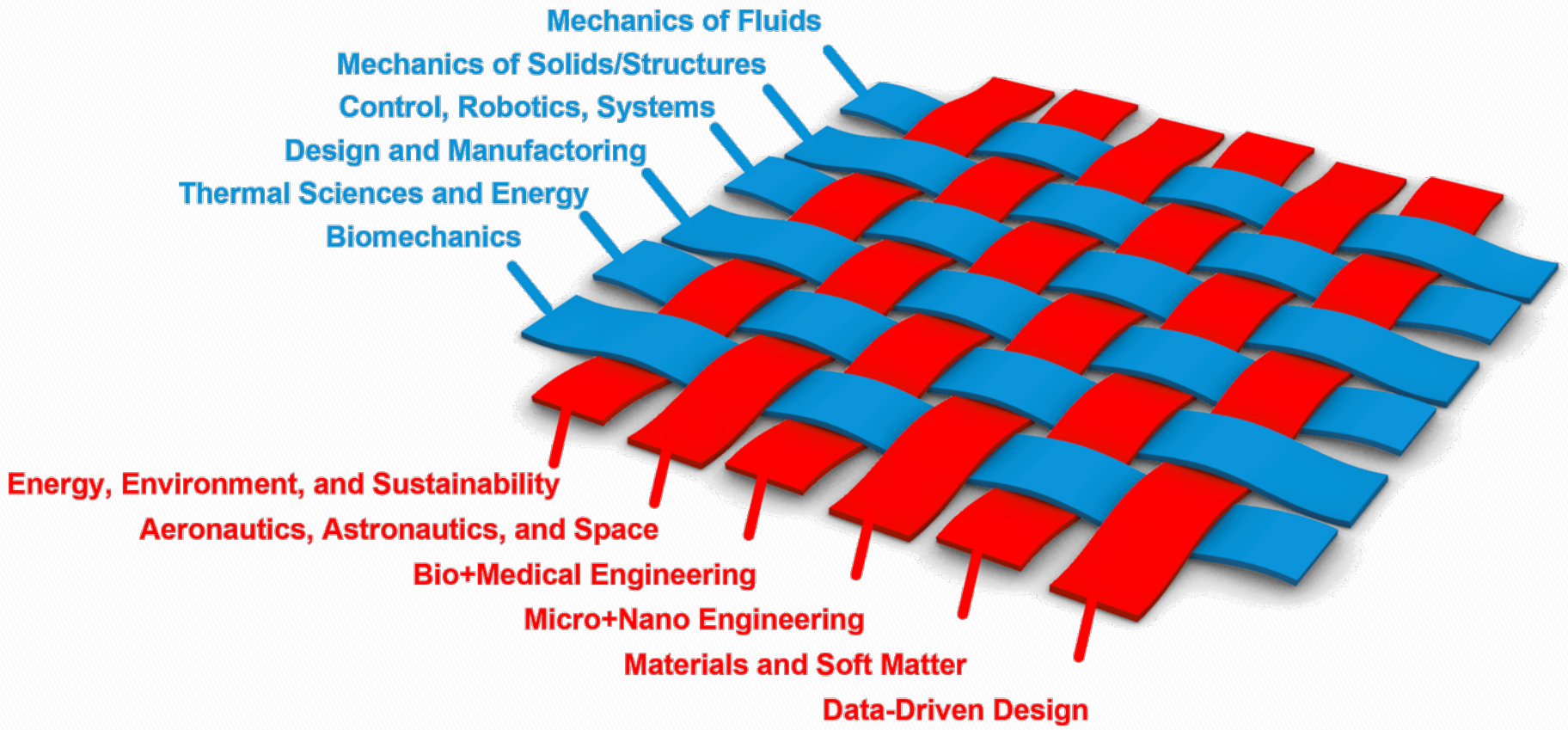
Mechanical Engineering Master @ EPFL

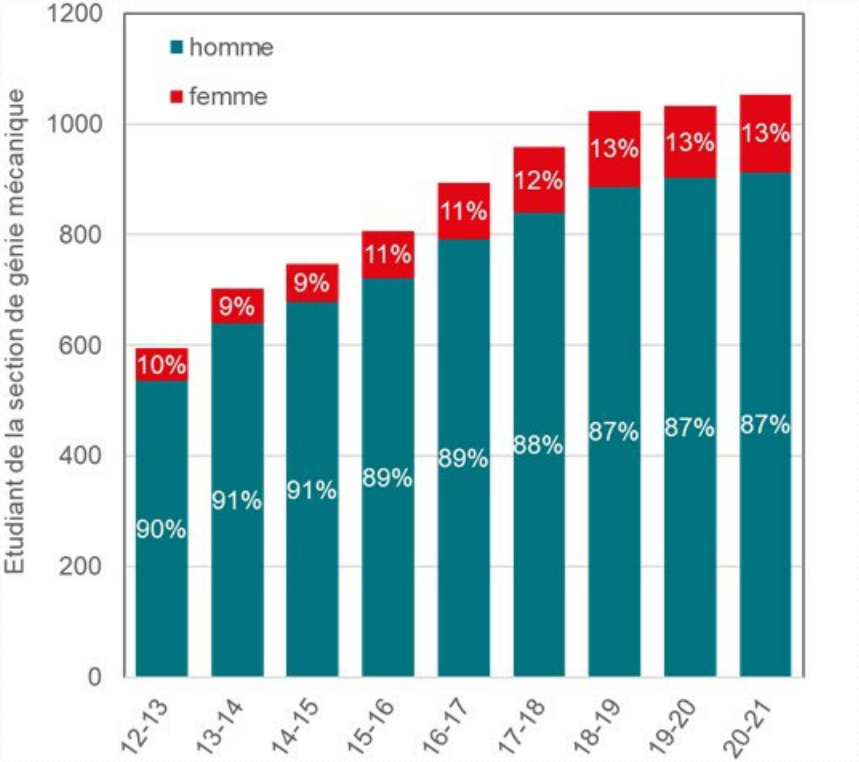
Agenda

A. Mechanical engineering Master @epfl.ch
B. Program's objectives
C. Orientations/specializations
D. Study plan
E. Admission criteria
F. Mechanical engineering labs, PhDs and Professors

A. Mechanical engineering Master @epfl.ch

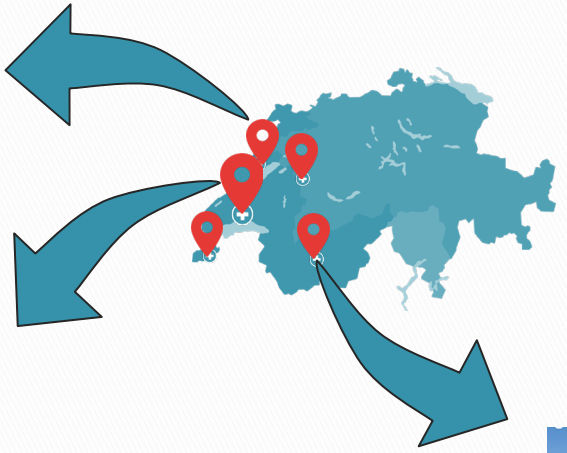


A. Mechanical engineering Master @epfl.ch



A. Mechanical engineering Master @epfl.ch

Neuchâtel → Design labs



EPFL worldwide

Lausanne → main campus

Sion → Energy labs

EPFL

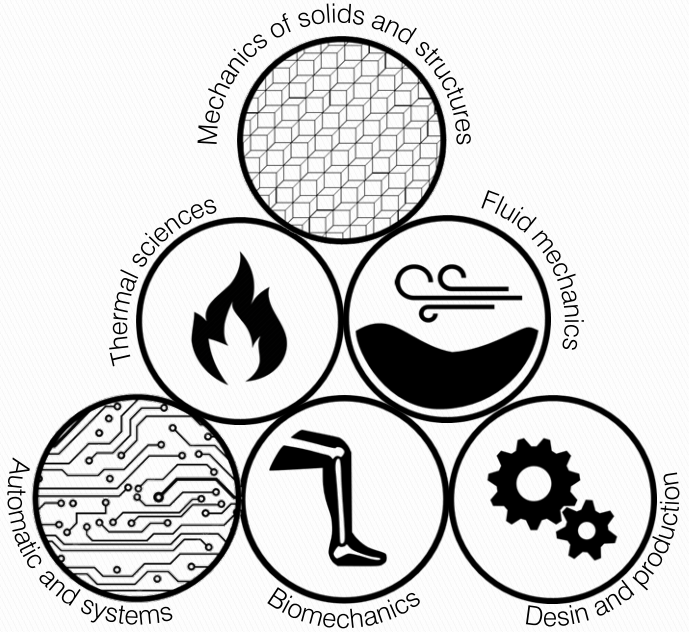
- Training in mechanical engineering is at the same time broad and very specialized (highly interdisciplinary).
- Going from computing the fluid flow around an airplane or optimizing a hip prosthesis, and managing large multi-faceted projects, such as the design, energy production systems, etc.
- Based on fundamental scientific knowledge and engineering know-how.
- The program develops competences in fluid and solid mechanics, biomechanics, automation, production systems and energy-related topics.
- It also fosters skills in advanced computation modeling and problem solving techniques.
- …

The program can be built around one of the following specializations (30 ECTS necessary):

A. Fluid mechanics
B. Automatic and systems
C. Design and production
D. Thermal sciences
E. Mechanics of solids and structures
F. Biomechanics

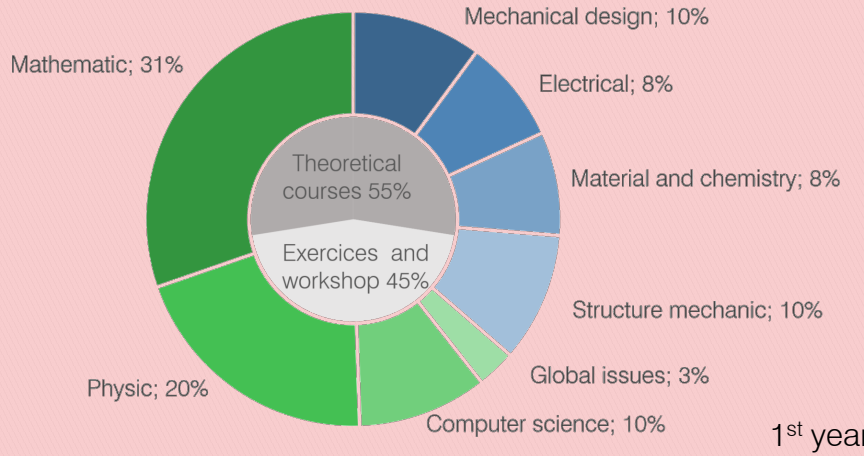
Students can also choose a 30 ECTS minor : recommended

- Biomedical technologies
- Computational science and engineering
- Energy
- Engineering for sustainability
- Management, technology and entrepreneurship
- Materials science
- Space technologies

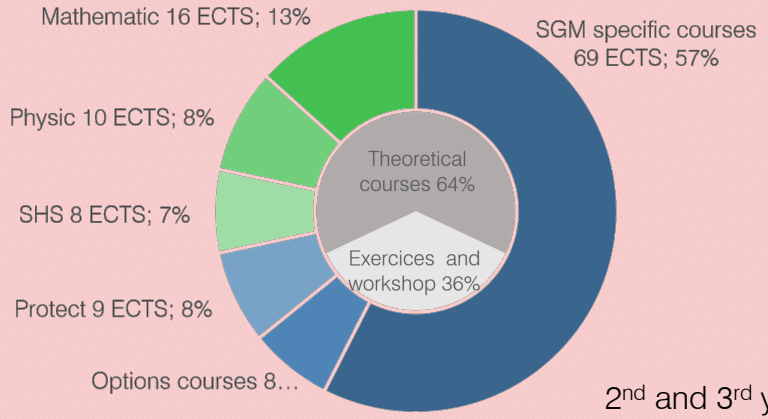


D. Study plan (consecutive Master degree)

Bachelor: 180 ECTS

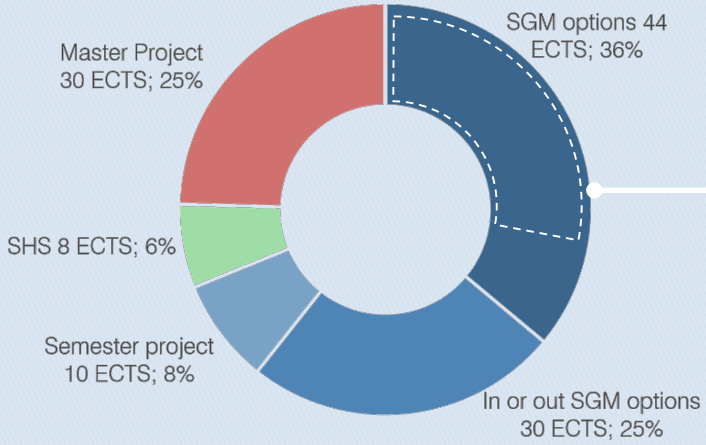


1st year



2nd and 3rd years

Master : 120 ECTS



Specialisation (ellective); 30 ECTS, 25%

- A Fluid mechanics
- B Automatic and systems
- C Desin and production
- D Thermal sciences
- E Mechanics of solids and structures
- F Biomechanics

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Interndhip

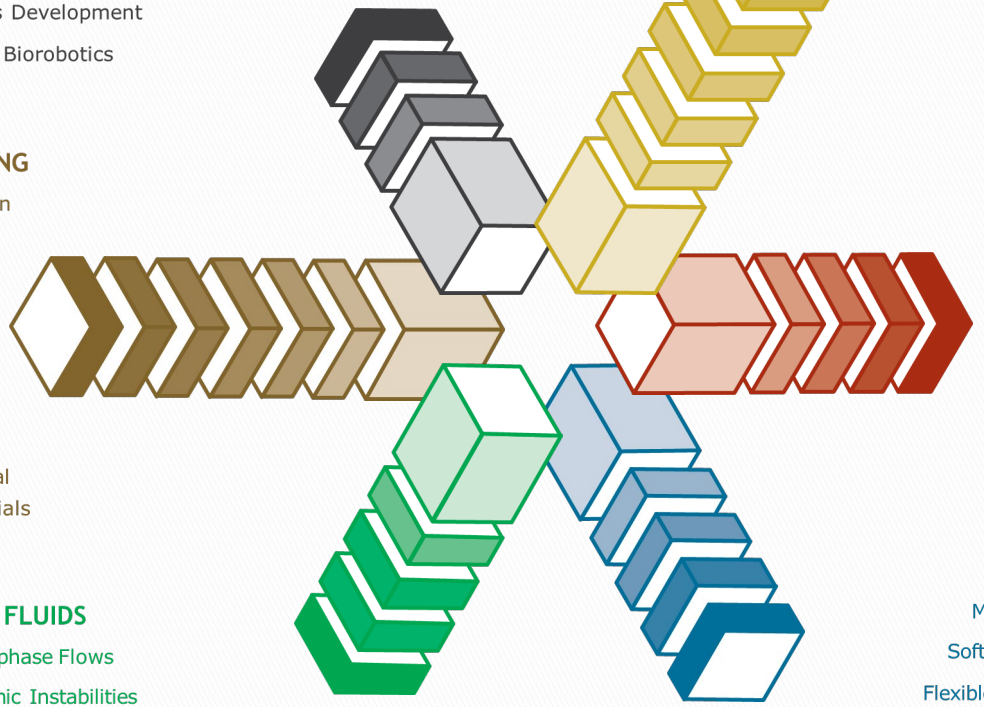
4th et 5th years

European Credit Transfer and Accumulation System : 1 ECTS = 30 work hours
(60 ECTS per year x 30 work hours / 45 work weeks = 40 hours by weeks)

E. Admission criteria

- Consecutively to the Bachelor in mechanical engineering from EPFL or ETHZ
- From another section of EPFL with a strong academic record and under the condition of validating a passerelle between 30 and 60 ECTS
- After having completed a bachelor degree in mechanics from a Swiss university and having obtained excellent academic record (GPA ≥ 85%) and under the condition of validating a passerelle between 30 and 60 ECTS to complete the missing orientation
- After having completed a bachelor's degree in mechanics in an excellent university abroad and having obtained an outstanding academic record

F. Mechanical Engineering Institute



CONTROL, ROBOTICS, AND SYSTEMS

- Control of Complex Adaptive Systems
- Robotics and Artificial Intelligence
- Optimization and Control of Intelligent Systems
- Data-Driven Modelling and Control
- Modelling and Control of Unique Interactive Robotics Systems
- Humanoid Control
- Multi-agents learning and control

BIOMECHANICS

- Biomechanical Orthopedics
- MicroBioRobotics Systems Development
- Locomotion Control and Biorobotics

DESIGN AND MANUFACTURING

- Computational Robot Design and Fabrication
- Micromechanical and Horological Design
- Information and Communications Technology for Sustainable Manufacturing
- Development of Environmentally Conscious Microfabrication Processes and Microsystems
- Applied Mechanical Design
- Development of Multi-Functional Stretchable Materials

THERMAL SCIENCES AND ENERGY

- Conversion of Renewable Energies
- Analysis and Synthesis of Sustainable Process and Energy Systems
- Nanophotonic Engineering of Light-Energy Harnessing, Conversion and Storage Systems
- Fuel Cells and Electrolysis

MECHANICS OF FLUIDS

- Cavitation and Multiphase Flows
- Hydrodynamic Instabilities and Free Interface Phenomena
- Unsteady Flow Diagnostics
- Emergent Complexity in Physical Systems

MECHANICS OF SOLIDS AND STRUCTURES

- Multiscale Mechanics Modeling
- Soft Materials
- Flexible Structures
- Nano-Electro-Mechanical Systems

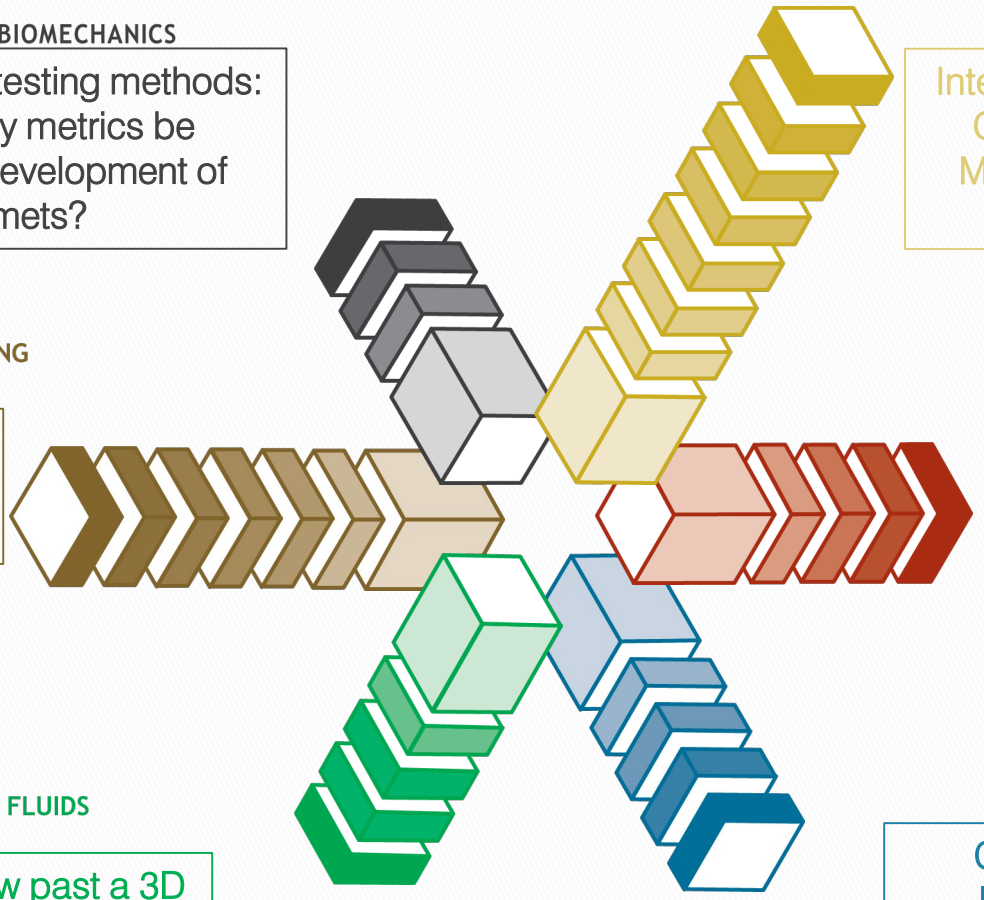
- **Lab** Master projects (between 2020-21 and 2021-22)

BIOMECHANICS

Limitations in helmet testing methods: should brain injury metrics be considered in the development of sports helmets?

CONTROL, ROBOTICS, AND SYSTEMS

Inter-seasonal Performance of Gaussian Process-based Model Predictive Control of Buildings



DESIGN AND MANUFACTURING

Modeling and investigation of small-scale gas bearing supported turbomachinery

THERMAL SCIENCES AND ENERGY

Synthesis of a planar ordered array of plasmonic nanospheres for self-healing

MECHANICS OF SOLIDS AND STRUCTURES

Contact Mechanics for Hyperelastic Materials

MECHANICS OF FLUIDS

Instability of the flow past a 3D rectangular bluff body

- **Industrial** Master projects (between 2020-21 and 2021-22)

BIOMECHANICS

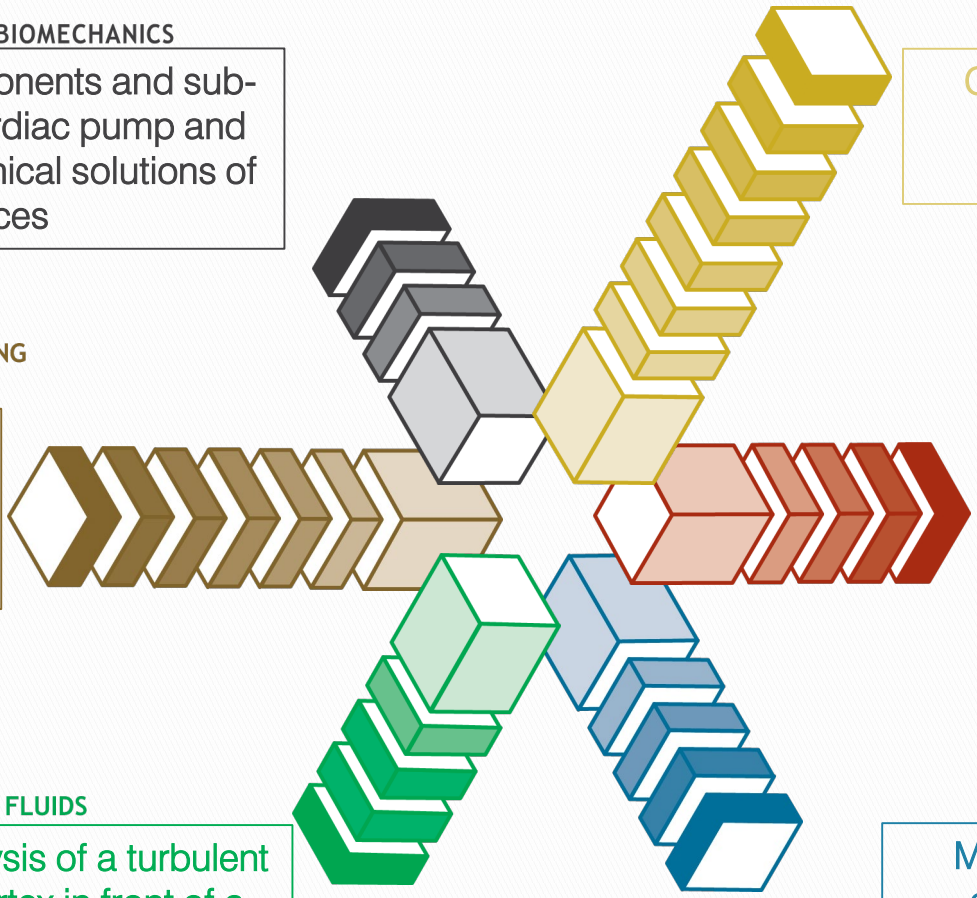
Analysis of the components and sub-components of a cardiac pump and improvement of technical solutions of the devices

CONTROL, ROBOTICS, AND SYSTEMS

Optimization of cold chain systems for drone-led deliveries and releases

DESIGN AND MANUFACTURING

Development of parametric numerical simulations predicting the failure conditions of thin plies composite shafts



THERMAL SCIENCES AND ENERGY

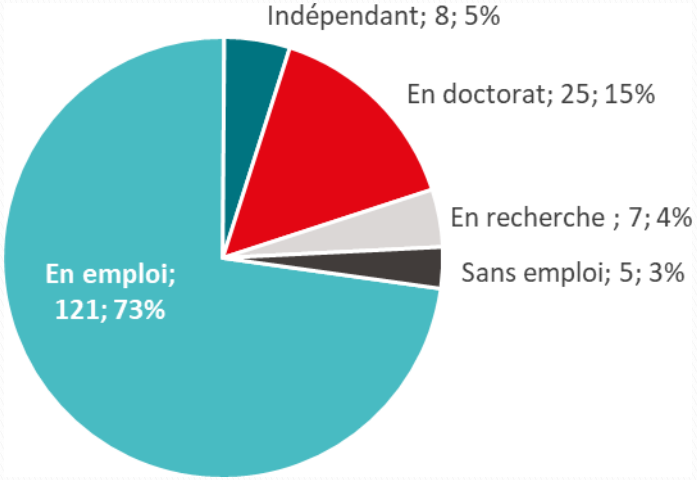
Industrial Process Optimization for Solar Fuels Production

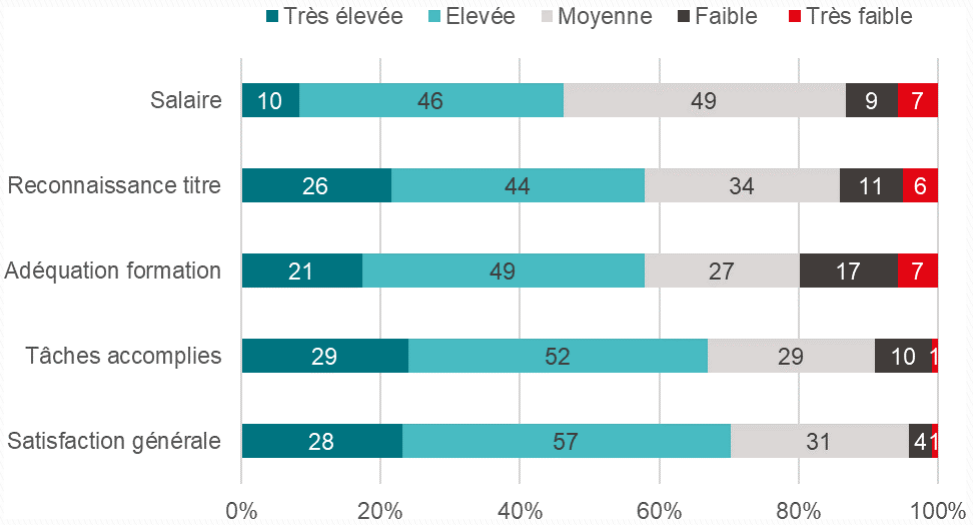
MECHANICS OF FLUIDS

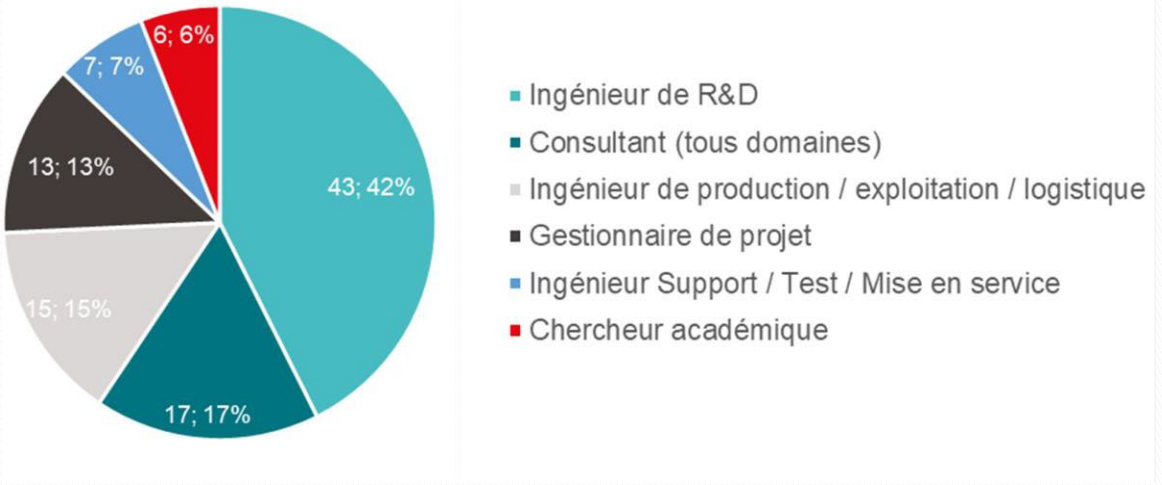
Statistical analysis of a turbulent horseshoe vortex in front of a hemisphere protruding from a rough bed

MECHANICS OF SOLIDS AND STRUCTURES

Multiscale modelling of a connection element for polymeric part


Indépendant; 8; 5%
En doctorat; 25; 15%
En recherche ; 7; 4%
Sans emploi; 5; 3%
En emploi; 121; 73%


Très élevée
Elevée
Moyenne
Faible
Très faible
Salaire 10 46 49 9 7
Reconnaissance titre 26 44 34 11 6
Adéquation formation 21 49 27 17 7
Tâches accomplies 29 52 29 10 1
Satisfaction générale 28 57 31 4 1
0%
20%
40%
60%
80%
100%


43; 42%
17; 17%
15; 15%
13; 13%
7; 7%
6; 6%
Ingénieur de R&D
Consultant (tous domaines)
Ingénieur de production / exploitation / logistique
Gestionnaire de projet
Ingénieur Support / Test / Mise en service
Chercheur académique

Thanks for your attention

sgm@epfl.ch