

Master in advanced mechatronics

Mechatronics = synergistic and integrated process of several sciences and skills : control and computer sciences, electronics, mechanics

Which allows to conceive and to design products and systems with augmented or improved functionality

Which requires to consider the conception of the product or system

- ✓ in its overall lifecycle
- ✓ in a cooperative interdisciplinary approach

But

- ✓ being an expert in each domain is impossible
- ✓ having a superficial background in each domain would be insufficient

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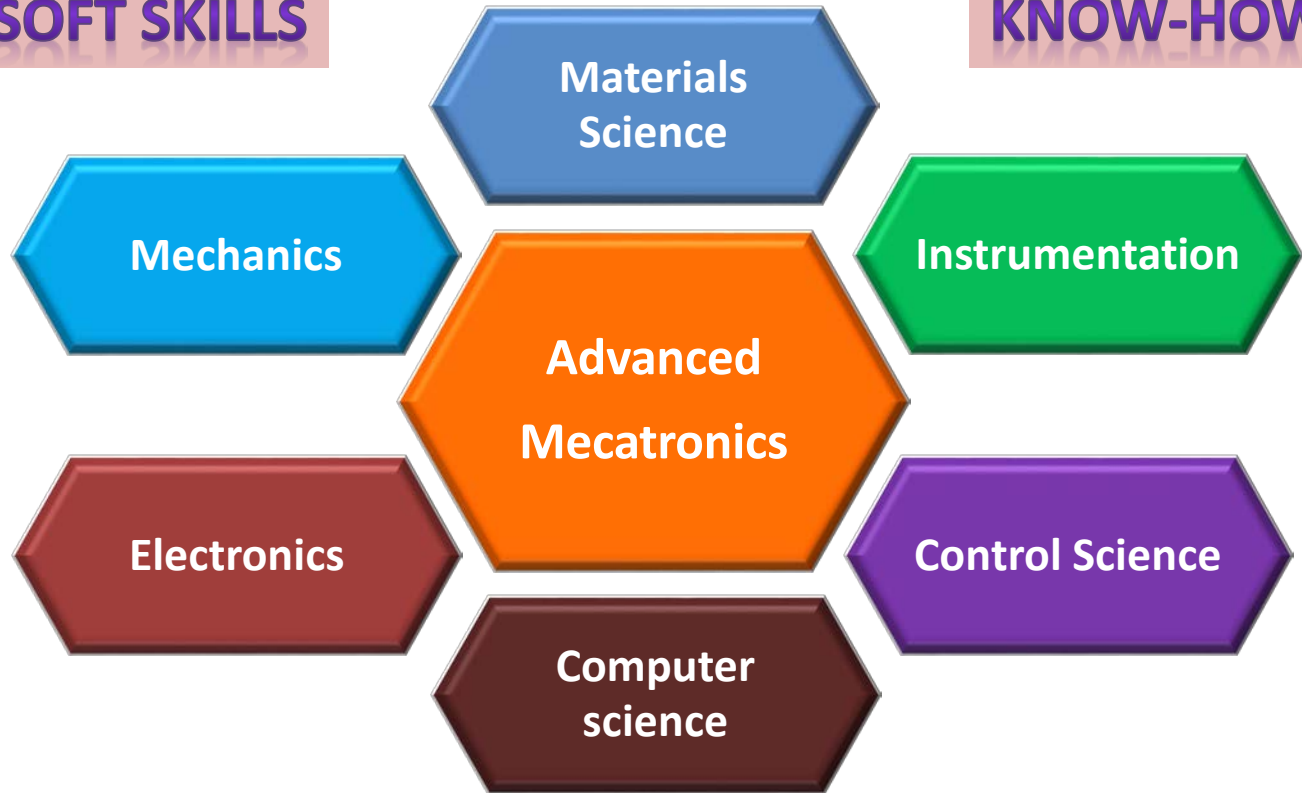
■ **The Master's students:**

- ✓ will gain specialized skills in at least one domain and enough additional skills in other domains to meet the requirements of a multidisciplinary mechatronic project;
- ✓ will become familiar with the requirements of a research activity.

Master in advanced mechatronics

SOFT SKILLS

KNOW-HOW



KNOWLEDGE

Professional skills:

Scientific communication -
Structuration and funding of
Research - Ethics (Plagiarism)
...

Transversal skills:

Collaborative work - Project
management - IP & patents -
Innovation - Social
responsibility - Language...

Competencies framework

3 main competencies

1. Design and achieve a mechatronical system

2. Manage a research project

3. Master the skills required for research activities

1. Design and achieve a mechatronical system

- ✓ By implementing the lifecycle of the system or product
- ✓ By implementing an integrated process of multiphysics and multi-technology modeling, simulation and design
- ✓ By choosing, designing and implementing the required sensors and instrumentation
- ✓ By designing the mechanical and/or electromechanical architecture
- ✓ By choosing, designing and implementing the digital infrastructure present **in and around** the system

2. Manage a research project

- ✓ By organizing his/her activity and the activity of his/her team
- ✓ By reporting to the research program manager
- ✓ By considering the questions of eco-responsibility of his/her projects and their legal and economic consequences

3. Master the skills required for research activities

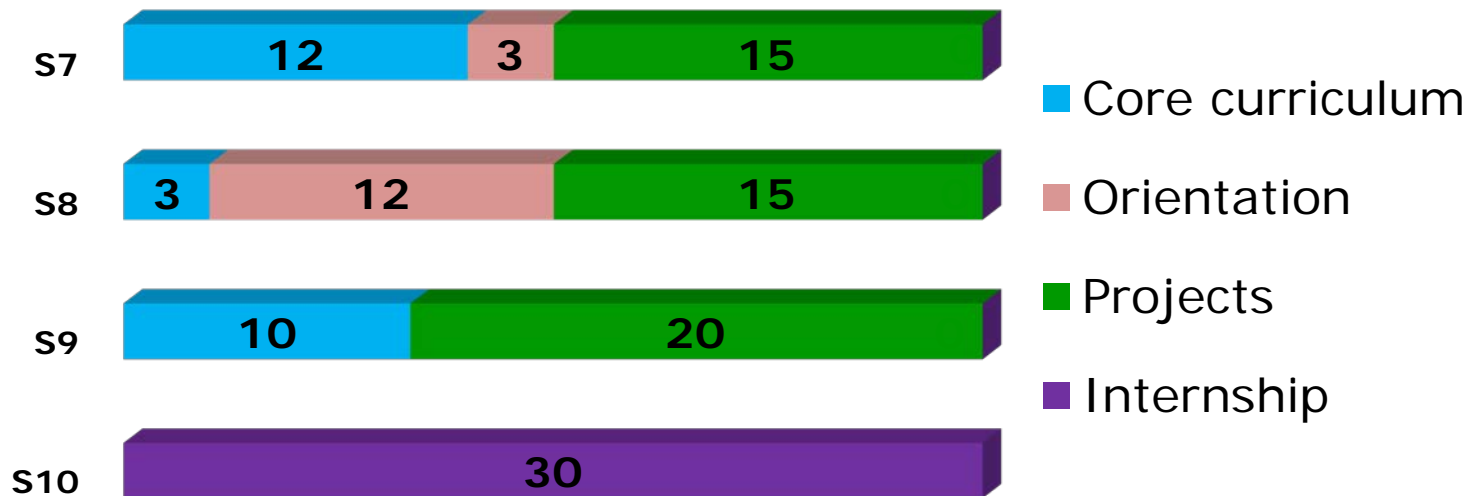
- ✓ By managing and spreading scientific knowledge
- ✓ By applying the principles of professional ethics
- ✓ By knowing how Research is organized and funded
- ✓ By understanding the issues of intellectual property
- ✓ By working in an international environment
- ✓ By managing uncertainty and challenges

Master's degree program structure

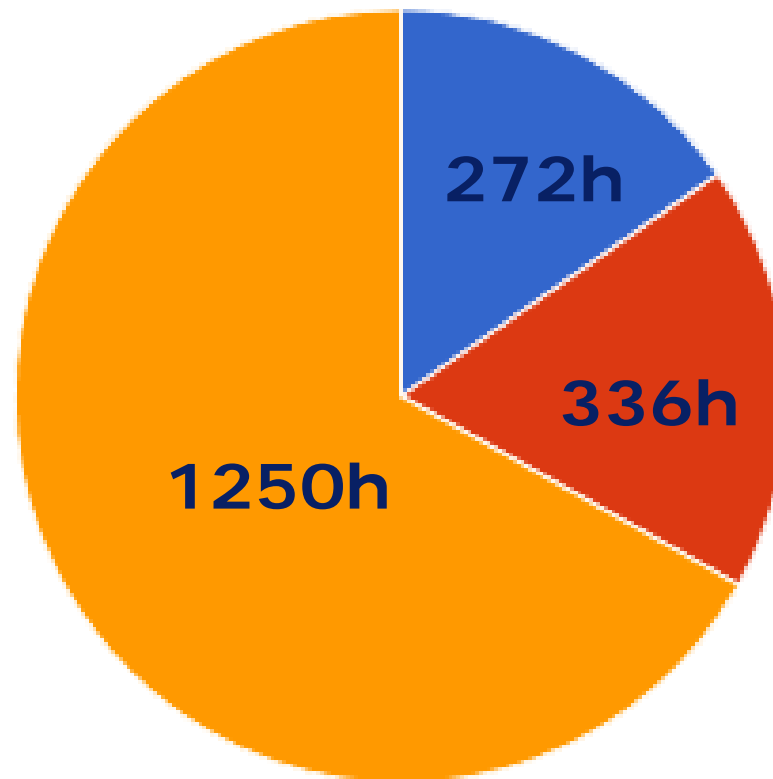
- 4 semesters (30 ECTS/semester)
- 3 semesters based on blended learning allowing the customization of the student cursus according to his/her background, his/her research project and his/her professional project:
 - ✓ Lectures/tutorials/practicals.
 - ✓ Self-learning with e-learning platforms.
 - ✓ Individual and collaborative project-based learning in research labs.
 - ✓ Supervision of each project by a staff member (associate professor or full professor).




From semesters S7 to S9:

- Project-based learning through research topics and through participation in an international challenge
- Academic learning with a core curriculum and elective courses spanning 3 orientations:
 - ✓ Innovative mechatronic product design
 - ✓ Autonomous wireless systems
 - ✓ Monitoring and control of mechatronic systems

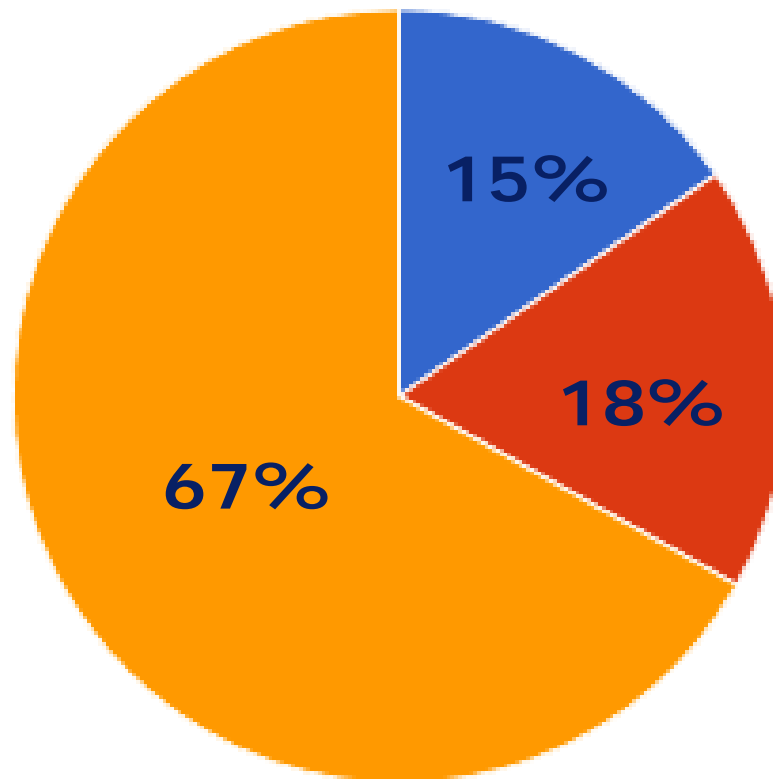





Overall schedule distribution S7-S8-S9



-  In-class hours/student
-  Estimated e-learning hours/student
-  Projects hours/student

Overall schedule distribution S7-S8-S9



-  In-class hours/student
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Semester 7: core curriculum (12 ECTS)

- Mechatronics common framework
- Metrology for mechatronic systems
- Project management
- Bibliographical tools
- Communication for research

In-class hours/student	Estimated e-learning hours/student	ECTS
68	112	12

Semester 7: projects (15 ECTS)

Mechatronical case study

individual

- To study the scientific and technological answers proposed to solve a given problem.
- 125h , 5 ECTS

Research

collective

- To propose a technological solution of a problem which is part of a research project.
- 150h, 6 ECTS

International challenge

collective

- To take part in a collective project in the framework of an international challenge.
- 100h, 4 ECTS

Semester 7: orientations (3 ECTS)

Innovative mechatronic product design

- Materials for Mechatronics
- Physics for mechatronic systems

In-class hours: 23

estimated e-learning hours: 40

Autonomous wireless systems

- Signals and systems, Continuous control
- Physics for mechatronic systems

In-class hours: 12

Estimated e-learning hours: 45

Monitoring and control of mechatronic systems

- Signals and systems, Continuous control
- Development and deployment frameworks

In-class hours: 20

Estimated e-learning hours: 34

Semester 8: core curriculum (3 ECTS)

- Modeling, simulation and numerical analysis
- Core skills, research organisations and standards

In-class hours/student	Estimated e-learning hours/student	ECTS
27	30	3

Semester 8: projects (15 ECTS)

Intellectual property

individual

- To study a family of published patents related to a mechatronical system.
- 125h , 5 ECTS

Research

collective

- To take part in the research project of a member of the permanent academic staff or in a project proposed by an M2 student.
- To study a bottleneck of this project and to propose a solution.
- 150h, 6 ECTS

International challenge

collective

- To take part in a collective project in the framework of an international challenge.
- 100h, 4 ECTS

Semester 8: orientations (12 ECTS)

Innovative mechatronic product design

- Multiphysics coupling in materials and Design of experiments
- Instrumentation electronics, MEMS and actuators
- Computer-aided design and Finite element simulation

In-class hours: 78

Estimated e-learning hours: 95

Autonomous wireless systems

- Physics for autonomous wireless systems and Design of experiments
- Instrumentation electronics, MEMS and actuators
- Embedded control and computer science
- Computer-aided design

In-class hours: 75

Estimated e-learning hours: 115

Semester 8: orientations (12 ECTS)

Monitoring and control of mechatronic systems

- Embedded control and computer science
- Architecture and robotics
- Data science
- Security: protect the system from intrusion

In-class hours: 103

Estimated e-learning hours: 108

Semester 9: core curriculum (30 ECTS)

- Embedded systems
- Introduction to supervision methods, models and tools
- Intellectual property, contracts, Law
- Scientific diffusion and Ethics
- Research funding and PhD
- Communication

In-class hours/student	Estimated e-learning hours/student	ECTS
74	50	10

Semester 9: projects

Research

individual

- To write a scientific article based on the S8 research project or the state of the art on a given mechatronical system
- 125h , 5 ECTS

Research

collective

- To take part in the research project of a member of the permanent academic staff or in a project proposed by an M2 student.
- To study a bottleneck of this project and to propose a solution.
- 250h, 10 ECTS

International challenge

collective

- To take part in a collective project in the framework of an international challenge.
- 120h, 5 ECTS

Semester 10: Internship (30 ECTS)

USMB Research labs associated to the project



SYMME

**Mechatronics
and Materials**



LISTIC

**Knowledge and
Information Processing**



LOCIE

**Energy and Building
Engineering**



Particle Physics



**Laboratoire Interuniversitaire
de Biologie de la Motricité**

**Inter-university
Laboratory of Human
Movement Biology**

Contact / Location

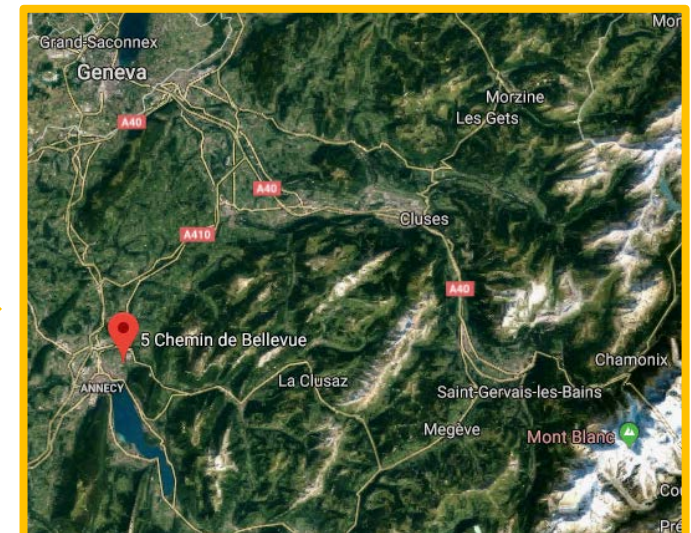
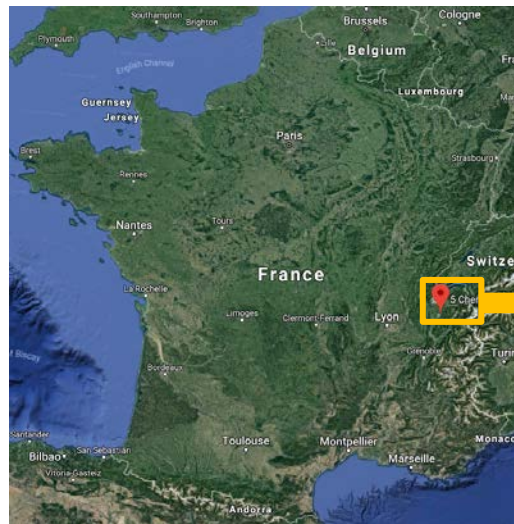
■ Contact:

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■ Location:

Savoie Mont Blanc University

ANNECY Campus



Savoie Mont Blanc: Come and enjoy it !

