



# MASTER IN MECHANICAL ENGINEERING

## TRACK SMART MECHANICS

UNIVERSITY SITE  
UFR ST, Besançon  
sciences.umlp.fr

POINTS ECTS  
60

LEVEL OF VALIDATED DIPLOMA  
MASTER DEGREE  
BAC + 5

COURSE DURATION  
268 h

FORM OF TEACHING  
Face-to-face

TRAINING  
Initial

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Domaine de formation : Sciences, Technologies, Santé

### PRESENTATION

The Smart Mechanics degree is an EIPHI graduate school master focusing on research and innovation in the field of Smart Structures for mechanics. Smart Structures are innovative solutions for applications as vibroacoustic control (NVH), Structural Health Monitoring, Shape Control, or Energy Harvesting for instance. Different strategies can be developed to add such new functionalities to structures as the design of complex architected technological solutions, the integration of smart materials with specific behaviors, or the development of embedded active devices with electronic circuits.

The Master's degree offers a one-year specialization to learn students about all these emerging structures for them to become a R&D engineer in a laboratory or a company in sectors such as transport, energy, defense, or prepare a PhD. Thus, the Master's degree aims to develop skills in design, modeling, numerical simulation, and experiments of smart structures. As such solutions are likely to involve many physical phenomena (optical, thermal, electromagnetic, ...) coupled to mechanical applications, the specialization includes methodologies for mechanical and multiphysic modeling with advanced mathematical, numerical and experimental tools.

3rd semester	Smart Dynamics	Smart Materials	Smart Structures	Tools for SmartMechanics	Smart Practices
4th semester	INTERNSHIP				



## ORGANIZATION

The Master's program comprises 2 semesters, each equivalent to 30 ECTS. It is offered to students enrolled in the Mechanics track of the 'Cursus Master en Ingénierie' in Smart Structures and Systems Engineering. All courses are taught in English.

The Smart Mechanics Master Degree is associated to the Department of Applied Mechanics of the FEMTO-ST Institute. One specialization of the department is the integration and functionalization of structures. Students work in the research laboratory for their projects, many of their teaching activities, and can carry out their internship in the premises.

## PROJECT AND INTERNSHIP

The Master's program focuses on training through research, with a laboratory immersion project in the 1st semester to explore a supervised scientific problem, followed by a long internship in a laboratory or corporate R&D department in the second semester.

## LEARNING OUTCOMES

On successful completion of the programme the student is able to:

- design a structure with smart functionalities to meet a mechanical need
- model the behavior of a material, a component or a structure
- perform numerical simulations, eventually in an uncertain or multiphysic context
- conduct characterization experiments
- carry out a research project including communicating on this project
- develop professional skills to define its own identity, work in a team, and think critically.

## HOW TO APPLY

Entry to the Master's program is selective.

Students enrolled in the 1st year of the Master's degree in mechanics can apply for the track, and the end-of-year jury will decide whether or not to validate their application.

For other students, applications are made via the unique Mon Master platform - [monmaster.gouv.fr](http://monmaster.gouv.fr). Students must submit an application file, which is evaluated by a pedagogical committee to assess the suitability of their course of study for the Master's program.

The course is a continuation of studies for holders of a Master 1 in mechanics. It is also a specialization for students with a Master's degree in mechanics or physics, or for students with an engineer degree.

Students from countries covered by the CEF procedure (Centres pour les études en France) must apply via the «Études en France» portal.

International students from other countries, particularly European Union member states, must apply via the MonMaster platform in the same way as student resident in France.

## A MASTER OF RESEARCH

The master's program is particularly aimed at developing research-related skills. It is adapted for students to wish to proceed to doctoral research, or it can be a standalone degree for those wish to learn through research.

## TARGETED POSITIONS

At the end of the Master's degree, graduates work as engineer or engineering consultant, research and development manager, or continue on to a doctorate to pursue an academic career or as a corporate expert. The main sectors of activity are transportation and energy.