

UTC

Master's Program

Mechatronic Systems



Mechatronics can be defined as a discipline that brings together mechanical engineering, electronics and IT. The SMT master's degree equips students to become fully operational professionals in this multidisciplinary field of engineering expertise, in particular in the design, control and characterization of complex mechatronic systems, from microsystems to complete vehicles.

The course combines elements of classical mechanical engineering, electronics and computer science, and there is a marked focus on systems. In today's world, students therefore graduate from the course with a high recruitment potential. The course is aimed at mechatronics (reinforcing their knowledge base and skills) and at mechanical engineers seeking to broaden their professional horizons with regard to mechatronics.

The French government awards a 'Laboratory of Excellence' (Labex) quality label to a small number of research institutions of particular merit, and the awarding of this label also depends on the quality of the teaching dispensed. This master's degree is an integral part of UTC's Labex relating to systems of systems.

#### Keywords

Sensors and actuators

Energy management for systems

Integrated, optimized design

Multiphysics modelling

Systems controls

Systems modelling

## COURSE CONTENT

The SMT master's degree includes modules that are designed to develop the specific skills that mechatronic engineering companies say they need now and will need in future. Key areas are :

- miniaturization of mechatronic systems,
- mechatronic systems powered by on-board sources,
- innovative compact actuators and sensors,
- systems engineering and integration,
- multiphysics modelling and optimal system design,
- controls for mechatronic systems.

## PROFESSIONAL OBJECTIVES

Conferring scientific and technological knowledge and skills of the highest level, equipping graduates for the design and modelling of innovative systems of systems (SoS), using a multidisciplinary approach.

## PROFESSIONAL OPPORTUNITIES

Students who successfully complete this SMT master's degree may choose to pursue a PhD, or to apply for professional positions in public or private research activities, in development and innovation as research scientists, project managers, systems and formal methodology experts, etc.

## SMT COURSE CONTENTS/OPTIONS

Class/Course Modules (30 credits/semester)	Credits (CCs)
<b>Semester 1</b>	
Complex mechanical behaviours	6
Primer to stochastic modelling	3
Tools used in scientific computation	3
Methodology in control synthesis	3
Electric power train systems	6
Vibration mechanics	6
Finite element structural modelling	6
Digital modelling for engineering problems	6
CAD: Geometric modelling	6
Introduction to mechanical properties and materials engineering	6
Primer to analogue electronics	6
Mechanical engineering design	6
Management, economics and setting up a business concern	4
Foreign language studies	4
<b>Semester 2</b>	
Introduction to systems engineering	6
Experimental protocols, instrumentation and information processing	6
System energy flows and transduction	5
Principles of sensors and instrumentation	6
Engineering mechanics of deformable solids	6
Electric machines	6
Electromagnetic phenomena	6
Printed circuits and micro-processors	6
Micro-processors, interfaces and basic software	6
Management, economics and setting up a business concern	4
Foreign language studies	4
<b>Semester 3 – 1st quarter</b>	
Optimization	3
Advanced systems engineering	3
Modelling uncertainty and its propagation	3
Biomimetics in systems of systems (SOS)	3
Modelling, control and observation of dynamic systems	3
Advanced data analysis	3
Robust systems design	3
System modelling and simulation	3
Foreign language studies	4
<b>Semester 3 – 2nd quarter</b>	
Micro-actuators and microsystems: methods and applications	3
Metrology and integrated communications for innovative mechatronic systems	3
Design and control of mechatronic systems with on-board power sources.	3
Design and multiphysics modelling of mechatronic systems	3
Active materials	3
Foreign language studies	4
<b>Semester 4</b>	
Master's degree Final internship	30

### Useful Information

#### Target population

Students with a primary background at French Baccalaureate +3 ("Bac+3") majoring in basic science, engineering sciences, science and technology ...

#### Admission

##### Year 1 : M1

Admission to first year (M1) is decided by assessment of the merits of the application file for students who have acquired a prior level at least "Bac+3" (first degree or equivalent).

##### Year 2 : M2

Direct admission to second year (M2) is decided by an assessment of the merits of the application file for students who have acquired a prior level at least Bac+4 (Master 1 or final year student-engineers registered at a recognized school of engineering).

#### Applications

The UTC Master's application file can be downloaded, as of March and should be returned, complete, to the Admission Office before mid-June (exact dates are set out on the UTC web-site) at:

[www.utc.fr/master](http://www.utc.fr/master)

