

## Semester 5

### Foreign languages and human sciences 1- 5 ECTS 84h

English  
Second language (optional)  
Firm organization  
Environmental sciences  
Accountancy  
Training by Physical Activities and Sports (FAP  
SA)

### Applied Mathematics 5 ECTS - 81h

Applied analysis  
Probabilities-Statistics  
Numerical analysis

### EEA - 6 ECTS - 90h

Electrical Engineering  
Sensors for mechanics  
Signal processing in mechanics

### Design and Manufacturing 1 - 4 ECTS - 60h

Mechanical manufacturing processes 1  
Design of mechanisms 1

### Mechanics 1 - 5 ECTS - 72h

Strength of materials  
Mechanics 1  
Mechanics 2  
Continuum Mechanics

### Fundamentals in Energetics 1 - 5 ECTS - 63h

Fluid mechanics for ideal fluids  
Fluid mechanics for Newtonian viscous fluids  
Thermodynamics 1

Total S5 : 30 ECTS, 450h

## Semester 6

### Foreign languages and human sciences 2 - 5 ECTS 84h

English  
Second language (optional)  
Personal communication techniques  
Engineer culture  
Health and security at work  
Training by Physical Activities and Sports (FAPSA)

### Innovation and Creativity 3 ECTS - 42h

### Creativity and Innovation Project Mechanics 2 3 ECTS - 52,5h

Elasticity  
Dynamic of continuous systems  
Dynamic of discrete systems 1

### Design and Manufacturing 2 - 6 ECTS - 100,5h

Design of mechanisms 2  
Mechanical manufacturing processes 2

### Fundamentals in Energetics 2 - 4 ECTS - 78h

Turbomachinery 1  
Rotational, flows  
Compressible flows and aerodynamics

### Fundamentals in Energetics 3 - 4 ECTS - 57h

Heat Transfer 2  
Thermodynamics 2

### Basic numerical tools - 5 ECTS - 66h

Finite Element Method (FEM)  
Computational Fluid Dynamics (CFD)

Total S6 : 30 ECTS, 480h

## Semester 7

Internship - 30 ECTS - 700h

## Semester 8

### Foreign languages and human sciences 3 - 6 ECTS 94,5h

English  
Second language (optional)  
Training by Physical Activities and Sports  
Group communication  
Intellectual property  
Entrepreneurship  
Human resources management

### Mathematics for engineers - 4 ECTS - 60h

Numerical Analysis 2  
Optimization

### Mechanical systems and structures 1 - 6 ECTS - 88,5h

Dynamics of discrete systems 2  
Analysis of Multibody systems  
CAD

### Advanced Energetics 1 - 6 ECTS - 90h

Acoustics  
Internal flows  
Thermodynamics  
Environmental footprint of activities  
Energetics 2

### Total Common basis ME - 22 ECTS - 333h

### CIM axis Mechanical integrated design axis

#### Mechanical Systems and Structures 4 ECTS - 54h

Structural dynamics  
Numerical Simulation in Dynamics  
Systems modeling

#### Materials and behaviors - 4 ECTS - 64,5h

Classes of materials  
Low-cycle fatigue  
Composite materials

### Total Mechanical integrated design axis - 8 ECTS 118,5h

### COMS axis Control and material optimization

#### General culture of Materials - 4 ECTS - 78h

Selection of materials  
Anisotropic materials and strengthening  
Ceramic materials and associated electric  
Metallic alloys and Corrosion

#### Non Destructive Testing (NDT) 4 ECTS - 64,5h

All techniques in Non Destructive Testing  
Research and Development in NDT by ultrasound

### Total Control and material optimization axis - 8 ECTS 142,5h

### MFE axis Fluid Mechanics and energetics axis

#### Advanced Energetics 2 - 4 ECTS - 72h

Turbomachinery 2  
Numerical tools for Energetics  
Advanced Thermal Sciences  
Moist Air

#### Advanced Fluid Mechanics - 4 ECTS -60h

Computational methods in fluid mechanics  
Laminar boundary layer  
Rheology of complex fluids

### Total Fluid Mechanics and energetics axis -8 ECTS 132h

### Total Common basis ME + CIM AXIS - 30 ECTS 451,5h

### Total Common basis ME + COM AXIS - 30 ECTS 475,5h

### Total Common basis ME + MFE AXIS - 30 ECTS -465h

## Semester 9

**Industrially based group project - 6 ECTS -120h**  
Industrially based group project

**Foreign languages and human sciences 4 - 4 ECTS  
63h**

English  
Second language (optional)  
Training by Physical Activities  
(FAPSA)  
Project management  
Labour law

**Elective courses - 3 ECTS - 42h**  
Elective course n°1  
Elective course n°2

**Total common basis 3A - 3 ECTS - 225h**

**CIM axis Mechanical integrated design  
CIM/Mechanical conception and measurements -  
4 ECTS - 63h**

Experimental analysis of vibrations  
Mechanical and thermomechanical metrology  
Multi-scale modeling in mechanics  
CAD shape parts

**CIM/Simulation and optimization in mechanics -  
4 ECTS - 63h**

Simulation of composite structures behavior  
Simulation of nonlinear behavior structures  
Optimization in mechanics

**Total CIM axis - 8 ECTS - 126h**

**A2S courses Structures Analysis and Security**

**Advanced simulations in Mechanics - 4 ECTS - 63h**  
Modeling structures and assemblies under extreme stresses  
Robust modeling and uncertainty engineering in mechanics

**Simulation of Complex Mechanical Systems - 4 ECTS  
63h**

Industrial noise, vibrations and harshness  
Multiphysics numerical modeling

**STCM courses Simulation of transformation and materials behavior**

**Manufacturing Processes - 4 ECTS - 63h**  
Forming of metallic alloys  
Forming of plastic materials

**Advanced materials and Damage of materials - 4 ECTS  
63h**

Multi-objective Selection of materials for design  
Fatigue, failure and durability of materials  
Mechanical behavior of polymers and charged polymers

**Total module - 8 ECTS - 126h**

**VINCI courses Computer aided design engineering and innovation**

**Computer aided Design Engineering- 4 ECTS - 63h**  
Computer aided design engineering  
Virtual Reality and Prototyping

**Innovative Design Workshop - 4 ECTS - 63h**  
Product Design  
Eco-Design

**Total Module - 8 ECTS -126h**

**COMS axis Materials Control and Optimization for structures**

**Technical analysis and characterization of materials  
4 ECTS - 61,5h**

Technical analysis of materials  
Analysis by diffraction  
Rheology and surface tension  
Spectroscopy methods

**Eco-design and durable materials - 4 ECTS - 54h**  
Multifunctional coatings functionalization of material  
LCA Methodology - Polymers and shaping  
Emerging materials and Eco materials

**Numerical simulations and analysis for NDT 5 ECTS  
64,5h**

Numerical methods in NDT  
Finite Element Method for elastic wave propagation  
Signal processing and analysis methods

**Eco-design and durable materials - 4 ECTS - 54h**

Multifunctional coatings functionalization of material  
LCA Methodology - Polymers and shaping  
Emerging materials and Eco materials

**Numerical simulations and analysis for NDT -5 ECTS  
64,5h**

Numerical methods in NDT  
Finite Element Method for elastic wave propagation  
Signal processing and analysis methods

**Sensors and instrumentation - 4 ECTS 55,5h**

Sensors and conditioners  
Instrumentation

**Total COMS AXIS - 17 ECTS - 235,5h****MFE axis Fluid Mechanics and energetics axis****Fluid Mechanics : Advanced Simulation and Measurements- 6 ECTS - 73,5h**

Measurement methods  
CFD  
Turbulence modeling  
Physics of turbulence  
BEN courses Buildings and renewable resources

**Energetics of buildings, dynamical thermal modeling,  
6 ECTS - 84h**

Energetic management and measurement  
Dynamical thermal modeling and energetic management  
Metrology and thermic regulation (rules)  
Energetic systems in buildings

**Thermal building concepts and renewable resources  
5 ECTS - 84h**

Thermal of building  
Renewable resources 1

**Total module BEN - 11 ECTS - 168h****TMD courses Transports and sustainable mobility****Terrestrial and aeronautical propulsion systems - Sustainable mobility - 6 ECTS - 96h**

Aeronautical propulsion  
Propulsion of ground vehicles  
Fuels and combustion

**Aerodynamic of ground and aeronautical transports  
5 ECTS - 72h**

Aeroacoustics  
Aerodynamics of transport 1  
Aerodynamics of transport 2  
Metrology in transport

**Total module - 11 ECTS - 168h****EIE courses Industrial energetic and environment  
Modeling, measurements and qualification of energy  
systems - 6 ECTS - 84h**

Metrology, regulation and control  
0D modeling of energy systems  
Energy and environment  
Sustainable mobility

**Conversion and energy transfer - 5 ECTS - 84h**

Industrial energetic systems  
Energy production

**Total module 11 ECTS - 168h****Semester 10****Junior engineer training - 30 ECTS 700h**