MASTER'S DEGREE PROGRAMME // M2

MECHANICAL ENGINEERING
Computational Solid Mechanics

How to apply?
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## Description

The Computational Solid Mechanics track in the Mechanics master’s program (M2) focuses on the mastery and development of innovative numerical methods (Big Data, X-FEM, Proper Generalized Decomposition, stabilized finite elements, etc.) in fluid, solid and structural mechanics, integrating the associated multi-scale or multi-physics couplings. The teaching is positioned at the interface between complex modeling, digitization and resolution, ranging from elasto-static or Newtonian fluids to the treatment of temporal non-linear problems (cyclic plasticity, contact, rupture, capillarity, etc.). The topics covered are directly linked to current industrial issues, with a focus on the trade-off between fidelity and robustness for optimum algorithmic and energy efficiency.

## Objectives

Train experts in the development of innovative simulations in the context of virtual engineering, which is increasingly present in industry. With a strong background in the mechanics of materials and structures, coupled with a mastery of cutting-edge numerical tools, the proposed course aims to train executives with the ability to manage R&D projects directly related to current societal concerns: structural lightening, durability control, dynamic sensing, etc.

### Common Courses*

- **12 ECTS**  
  - Finite element method in mechanics
  - Modeling in mechanics of materials

### Specialization Courses*

- **12 ECTS**  
  - Big data, model reduction and digital twins
  - Multi-physics couplings for processes
  - Advanced numerical methods

### Opening Courses*

- **6 ECTS**  
  - Intensive calculations
  - Numerical methods for simulating dynamic mechanical models

### Complementary Courses*

- **9 ECTS**  
  - English for business communication level 2
  - Socio-economics of business
  - Internship preparation. Bibliography

### Internship*

- **21 ECTS**  
  - Minimum 16 weeks
  - Written report
  - Oral presentation

* All the courses are taught exclusively in French