



**Master**  
**Mechanical Engineering**

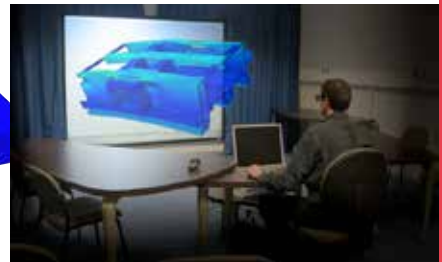
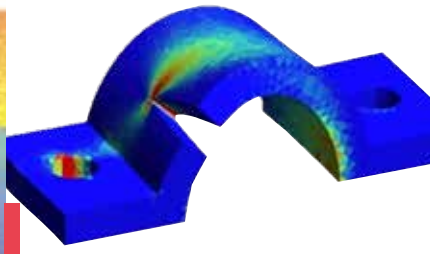


## COMPUTATIONAL MECHANICS

### OBJECTIVES

This Master programme develops skills in advanced techniques in scientific computing at the interface between scientific disciplines for the modelling of mechanical engineering problems.

The courses cover the modelling and numerical simulation of complex mechanical systems (both fluid and solid) involving a possible coupling of different physics at different scales. The training is based on a global approach towards the issues associated with numerical modelling, from the construction of models and their discretization to the numerical resolution of discrete models, and to the mathematical analysis of models and approximation methods.



### SKILLS

#### Specialism-specific

- > Model solids and fluid flow problems
- > Use advanced numerical and scientific technics to discretize and solve mechanical problems
- > Master the mathematical analysis of models and approximation methods

#### General

- > Identify models, perform simulation and analyse results
- > Communicate comprehensive results in a meaningful way
- > Undertake bibliographic surveys from international research and professional literature
- > Manage or be part of a project

### JOB PROSPECTS & FURTHER PHD STUDIES

**SECTOR:** Aeronautics, Automotive, Transportation, Wind and Marine Energy, Software, Consulting.

**FIELDS:** Mechanical Engineering, Design, Research and Innovation.

**JOB POSITIONS:** Computational Engineer, Mechanical Engineer, Research and Innovation Engineer (post PhD).



**Location**  
Nantes, France -2 hours from Paris

**International campus life**

**87** nationalities  
**43%** international students



Master in Sciences, Technologies and Health

## EXAMPLES OF FINAL YEAR PROJECTS

### 5 to 6 month internship in Industry

- > Optimization of mechanical Modelling Tools
- > Numerical modelling of smart composite structures
- > Improved workpiece design loop Structures in Thermoplastics for Automobile industry

### 5 to 6 month thesis in Research Labs

- > Aerodynamic simulation of a wind turbine
- > Development of optimization algorithms on tensor manifolds exploiting their fiber bundle structures
- > Numerical simulation of composite impregnation using reactive resine

## FACULTY, INDUSTRIAL PARTNERS AND RESEARCH LABS

This Master relies on the Centrale Nantes' faculty, staff and research facilities of the GeM Institute, the Jean Leray laboratory, the LHEEA Laboratory and the LS2N Institute. Centrale Nantes has several industrial partnerships with Airbus, Renault, Faurecia, Solvay, IFREMER, CETIM.

## OTHER PROGRAMME INFORMATION

- > Length of Studies: 2 years
- > Language of instruction: English
- > 3 semesters of courses and 1 semester of Master's thesis

**Tuition & Fees - Scholarships - Application process - Deadlines**

**MORE INFORMATION AND FULL PROGRAMME:**  
[www.ec-nantes.fr/masters](http://www.ec-nantes.fr/masters)

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## CONTENT AND COURSES

(A Master Degree requires the validation of 120 ECTS credits)

M1 - AUTUMN SEMESTER	ECTS
Continuum Mechanics	5
Fluid Mechanics	5
Programming and Algorithm	4
Numerical Methods	4
Vibration and Differential Equations	4
Business Environment	4
Modern Languages	4
M1 - SPRING SEMESTER	ECTS
Probability and Statistics	5
Numerical Analysis	5
Structural Mechanics	5
Fluid Mechanics 2	5
Mechanical Design	4
Conferences and Initiation to Research	2
Modern Languages	4
M2 - AUTUMN SEMESTER	ECTS
Computational Configurational Mechanics	3
Computational methods for incompressible flows	3
Domain decomposition and iterative solvers	4
Extended Finite Element Method and level set techniques	3
Model Reduction	3
Numerical methods for simulation of coupled problems	3
Numerical methods for uncertainty quantification	3
Physical Modeling of Fluids	4
Modern Languages	4
M2 - SPRING SEMESTER	ECTS
Master Thesis or Industrial Internship	30

NB Course content may be subject to minor changes

Ecole Centrale de Nantes. Direction de la communication. July 2019