



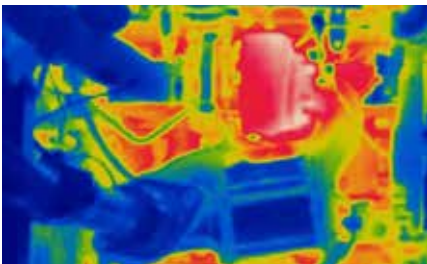
**Master**  
**Mechanical Engineering**

## ENERGETICS & PROPULSION

### OBJECTIVES

This Master develops skills for designing and optimizing innovative propulsion plants with a focus on thermofluid processes and energy conversion for research and industry.

Internal Combustion Engine and turbojet performance and efficiency are influenced by various processes including gas flow, compression and expansion through turbomachines or reciprocating piston, fuel injection and combustion, energy conversion and heat transfer. Therefore the curriculum offered in this program will provide an emphasis on all these processes and how they interact.



### SKILLS

#### Specialism-specific

- > Design engines and components
- > Build and use simulation models of engines and powertrains
- > Develop control strategies and calibrate ECU engines

#### 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:** Automotive, Industrial engines, Aeronautics, Transportation, Power plants, Energy.

**FIELDS:** Engine design & calibration, Modelling and simulation, Research and Innovation, Thermofluid Engineering.

**JOB POSITIONS:** Thermofluid Engineer, Design engineer, Calibration Engineer, modelling Engineer, Research 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

- > design of coolant, oil and intake air temperature control to simulate variations during one track lap for a formula one engine
- > Experimental investigation regarding the influence of high temperature on the aqueous urea dosing unit for Daimler Trucks
- > Demonstrator Development for Aircraft Jet engines Applications

### 5 to 6 month thesis in Research Labs

- > Experimental study of wall wetting phenomenon on a port injection SI engine
- > Experimental study and phenomenological modelling of wall heat transfer in an IC engine
- > Experimental study of RCCI combustion with endoscopic investigations

## FACULTY, INDUSTRIAL PARTNERS AND RESEARCH LABS

This Master relies on the Centrale Nantes' faculty, staff and research facilities of the IC Engines Research group of the LHEEA Laboratory, which has several industrial partnerships such as with Renault, Mann+Hummel, Valéo.

## 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)

**CONTACT:** [master.admission@ec-nantes.fr](mailto:master.admission@ec-nantes.fr)

## CONTENT AND COURSES

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

M1 - AUTUMN SEMESTER	ECTS
Continuum Mechanics	5
Fluid Mechanics	5
Algorithmics for Engineering Modelling	4
Numerical Methods	4
Vibrations and Differential Equations	4
Business Environment	4
Modern Languages	4
M1 - SPRING SEMESTER	ECTS
Fluid Mechanic 2	5
Mechanical Design	4
Energetics	5
Propulsion	5
Hydrodynamics	5
Conferences and Initiation to Research	2
Modern Languages	4
M2 - AUTUMN SEMESTER	ECTS
Combustion	5
Gas Dynamics and heat transfer	5
Turbomachinery	5
Internal Combustion Engines	5
Hybrid Powertrain and Energy Management	3
Practical and Simulation	3
Modern Languages	4
Conferences	-
M2 - SPRING SEMESTER	ECTS
Master Thesis or Industrial Internship	30

NB Course content may be subject to minor changes

École Centrale de Nantes. Direction de la communication. novembre 2019