



Master

Control and Robotics

## EMBEDDED REAL TIME SYSTEMS

### OBJECTIVES

Acquire theoretical and methodological knowledge for the modelling and the analysis of embedded and real time systems and for the design of reliable solutions.

This programme introduces the techniques currently used for the design and the verification of embedded systems, and more especially real-time embedded systems. The track relies on several courses covering various topics: the design of real-time systems and the architecture of a real-time operating system (OSEK/VDX standard is used); the real-time scheduling policies and the associated implementation; tools for the modelling and verification of real-time systems: Petri net, finite state automata and timed automata.



### SKILLS

#### Specialism-specific

- > Model and analyse embedded systems subjected to energy and real time critical constraints
- > Master the whole design and development cycle of embedded systems (from their specification to their implementation and certification)
- > Acquire the knowledge of the specific characteristics of new generations of embedded systems (OS Autosar, multi-core targets, etc.)

#### 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, Materials Producers, Consulting.

**FIELDS:** Mechanical Engineering, Design, Materials, Advanced Processes, Manufacturing, Research and Innovation.

**JOB POSITIONS:** Mechanical Engineer, Process Engineer, Design 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

- > Design of Embedded Systems for Drones
- > Internet of Things (IoT): connecting Embedded System
- > Modelling and validation of an aerial video tracking system

### 5 to 6 month thesis in Research Labs

- > Multicore Real Time operating systems
- > Formal verification of parametric systems
- > Task Scheduling in Energy Harvesting Real-time Embedded Systems

## FACULTY, INDUSTRIAL PARTNERS AND RESEARCH LABS

This Master relies on the Centrale Nantes' faculty, staff and research facilities of the LS2N Institute. Centrale Nantes has several industrial partnerships such as Airbus, Thales, Smiles, Renault (...) involved in this master through projects, contracts and internships. Moreover, we have many collaborations with research departments abroad such as with Ecole Polytechnique de Montréal, Aalborg University, TU Munich...

## 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
Signal Processing	5
Classical Linear Control	5
Artificial Intelligence	4
Embedded Electronics	4
Advanced and Robot Programming	4
Embedded Computing	4
Modern Languages	4
M1 - SPRING SEMESTER	ECTS
Group Project	6
Optimization Techniques	4
Mobile Robots	4
Programming Real Time Systems	4
Software Architecture for Robotics	4
Computer Vision	4
Modern Languages	4
M2 - AUTUMN SEMESTER	ECTS
Embedded Software Systems	4
Embedded Systems Design	4
Automated Planning	4
Real Time Scheduling	4
Formal Modelling and verification	4
Petri Nets	4
Project	2
Modern Languages	4
Conferences	-
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, novembre 2019