



Master

Control and Robotics

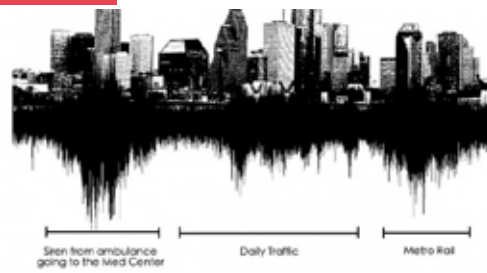
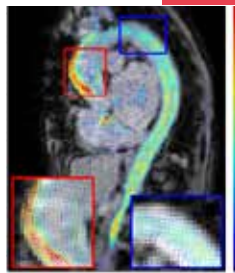


## SIGNAL AND IMAGE PROCESSING

### OBJECTIVES

The Signal and Image Processing programme addresses the theory and the practice of advanced data analysis techniques, from computational statistics, applied mathematics, scientific computing and numerical imaging, to their practical implementation in several fields such as biomedical engineering, imaging science, audio processing and information technology.

The key feature of the programme is the design of mathematical solutions for signal and image processing problems, accounting for the physical specificities of this data, and adapting the numerical implementations of these solutions to the application context, to the data size and to the available computational resources.



### SKILLS

#### Specialism-specific

- > Establish a relevant statistical model for data representation and analysis
- > Propose a methodological solution and its numerical implementation suited to the application context
- > Have a solid background on real-life applications of signal and image processing in research and innovation

#### General

- > Identify models, perform simulations and analyze results
- > Undertake a literature survey of existing works on a scientific problem
- > Communicate comprehensive results in a meaningful way
- > Manage and supervise research and innovation projects

### JOB PROSPECTS & FURTHER PHD STUDIES

**SECTOR:** Health, Communication technologies, Transportation.

**FIELDS:** Biomedical engineering, Imaging science, Audio engineering, Computer science, Applied mathematics and statistics, Research and development.

**JOB POSITIONS:** Data analyst, Research scientist, Design engineer, Process engineer, Technical project supervisor.



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

**International campus life**

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



Master in Sciences, Technologies and Health

## EXAMPLES OF MASTER THESES

### 5 to 6 month internship in Medicine

- > Analysis of Electromyographic signals for neuromuscular disease characterization
- > Reconstruction of Positron Emission Tomography images in the context of low statistics
- > Resolution enhancement in Magnetic Resonance Imaging for cardiovascular diagnosis

### 5 to 6 month internship in Industry

- > Optimization of a tyre pressure monitoring system in an automotive vehicle
- > Fast imaging algorithm for structured illumination microscopy

### 5 to 6 month thesis in Research Labs

- > Numerical optimization for sparse ultrasound signal recovery
- > Analysis and classification of environmental sounds using deep learning methods

## FACULTY, INDUSTRIAL PARTNERS AND RESEARCH LABS

This Master relies on the Centrale Nantes' faculty, staff and the research facilities of the Laboratory of Digital Sciences of Nantes (LS2N).

Centrale Nantes has several industrial partnerships with regional, national and international companies and groups (IRT Jules Vernes, Nantes University Hospital, Total, Renault).

## 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
Systems Identification and Signal Filtering	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
Spectral and Time Frequency Analysis	4
Computer Vision	4
Modern Languages	4
M2 - AUTUMN SEMESTER	ECTS
Statistical Signal Processing and Estimation Theory	4
Digital Signal and Image Representations	4
Machine Learning, Data Analysis and Information Retrieval	4
Signal and Image Restoration, Inversion Methods	4
Mathematical tools for signal and image processing	4
Biomedical Sensing Systems and Methods	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