



**Master**

**Control and Robotics**



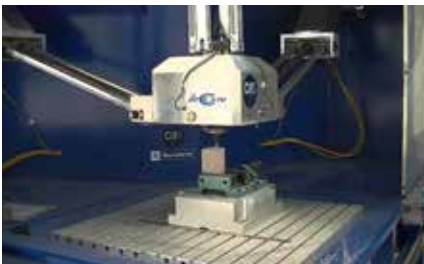
Graduate programme | Master in Sciences, Technologies and Health

## ADVANCED ROBOTICS

### OBJECTIVES

The main objective is to master the modelling and control of complex robots evolving in dynamic environments by using proprioceptive and exteroceptive perception.

The focus is on advanced robotics but more generally, it deals with modern techniques in systems engineering for the modelling, simulation, optimisation, analysis, and control of a variety of robotics systems. It also takes into account the modelling and perception of the environment. The quality of this Master has been recognized by the European Union by supporting the European Master on Advanced Robotics (EMARO+) in the framework of the Erasmus Mundus programme.



### SKILLS

#### Specialism-specific

- > Master the various fields of advanced robotics and smart robots (kinematic and dynamic modelling, dynamic command, computation, perception organs and mechanical design)
- > Merge design and implantation of robotic systems in their environment
- > Possess a body of knowledge of case studies in growing sectors (production robotics, autonomous vehicles, humanoid robotics...)

#### General

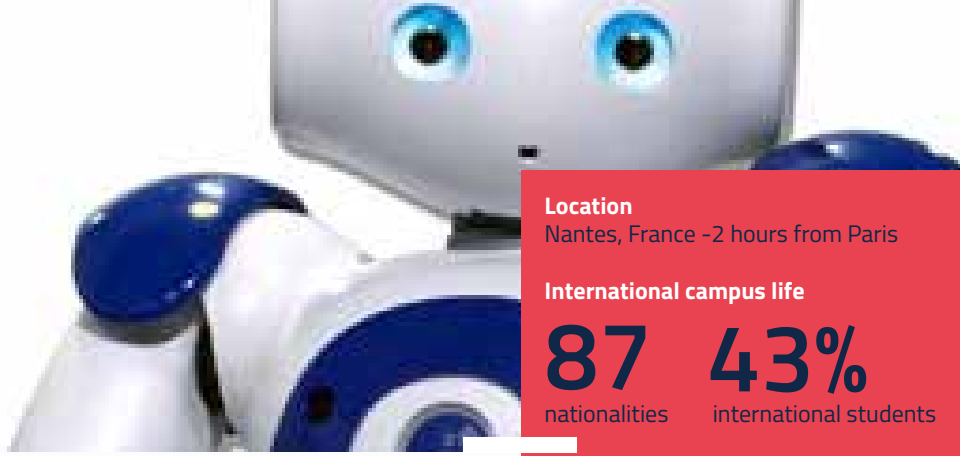
- > Identify models, perform simulation and analyse results
- > Communicate comprehensive results in a meaningful way
- > Undertake bibliographic surveys from international research and professional literature
- > Manage or be part of a project

### JOB PROSPECTS & FURTHER PHD STUDIES

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

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

**JOB POSITIONS:** Mechanical Engineer, Robotics 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

- > Control and Navigation Strategies in Uncertain Environments with Human Operators (AGI)
- > Obstacle and self-collision avoidance with a dual-arm Manipulator (AGI)

### 5 to 6 month thesis in Research Labs

- > Off road platooning
- > Optimum Design, Prototyping and Control of a 6-dof Cable Driven Parallel Robot with a large orientational workspace
- > Analysis of human walking behavior to improve humanoid walking patterns

## 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 with BA System, Airbus Group Innovation, Gaussin, Renault, Akka Technologies, GE, Tecnelia, IRT Jules Vernes, ...

## 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
Signal Processing	5
Classical Linear Control	5
Artificial Intelligence	4
Modelling of Manipulators	4
Advanced and Robot Programming	4
Mechanical Design Methods in Robotics	4
Modern Languages	4
M1 - SPRING SEMESTER	ECTS
Group Project	6
Optimization Techniques	4
Mobile Robots	4
Dynamic Model Based Control	4
Software Architecture for Robotics	4
Computer Vision	4
Modern Languages	4
M2 - AUTUMN SEMESTER	ECTS
Advanced Modelling of Robots	5
Research Methodology	5
Sensor-based Control of Complex Robots	4
Advanced Visual Geometry	4
Humanoid Robotics*	4
From human motion to humanoid control*	4
Autonomous Vehicle*	4
Optimal Kinematic Design*	4
Modern Languages	4
Conferences	-
M2 - SPRING SEMESTER	ECTS
Master Thesis or Industrial Internship	30

\* Elective courses - choose 2 out of 4

NB Course content may be subject to minor changes

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