

# Advanced Robotics

INTEGRATED MASTER-PHD TRACK  
CONTROL AND ROBOTICS

Centrale Nantes offers **high-potential students** the opportunity to join our 'two plus three'-year Integrated Master-PhD Track, fully taught in English for a cohort of international students. This track **draws on the areas of excellence of our research institutes and our existing MSc programmes** to bring together two years of Master's studies and three years at PhD level.

The main objective of the Advanced Robotics theme 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 the specialism 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.

### Why choose this track?

- Well-respected scientific expertise of the Laboratory of Digital Sciences of Nantes (LS2N)
- Reinforced research activities right from year one: research projects, access to research facilities with practical work in the unique experimental test facilities
- Close supervision and mentoring by a member of faculty
- Internship and research mobility opportunities thanks to our partner institutions and firms around the world

### Skills

- 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...)
- 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.

### OUR PROGRAMME

Master 1&2 (120 ECTS)

#### M1 - Semester 1

- ✓ Advanced and Robot Programming
- ✓ Artificial Intelligence
- ✓ Classical Linear Control
- ✓ Mechanical Design Methods in Robotics
- ✓ Modelling of Manipulators
- ✓ Signal Processing
- ✓ Language courses

#### M1 - Semester 2

- ✓ Research Project
- ✓ Computer Vision
- ✓ Dynamic Model Based Control
- ✓ Mobile Robots
- ✓ Optimization Techniques
- ✓ Software Architecture for Robotics
- ✓ Language courses

#### M2 - Semester 1

- ✓ Advanced Modeling of Robots
- ✓ Task-based Control
- ✓ Advanced Research Project
- ✓ Language courses

#### Elective courses (choose 3 out of 4)

- ✓ Autonomous Vehicle
- ✓ Advanced Visual Geometry
- ✓ Aerial and maritime drones
- ✓ Soft Robot Modelling

Students start in the Master's programme in Advanced Robotics and may join the Master-PhD track after the first semester. From the second semester of M1, the focus shifts to research.

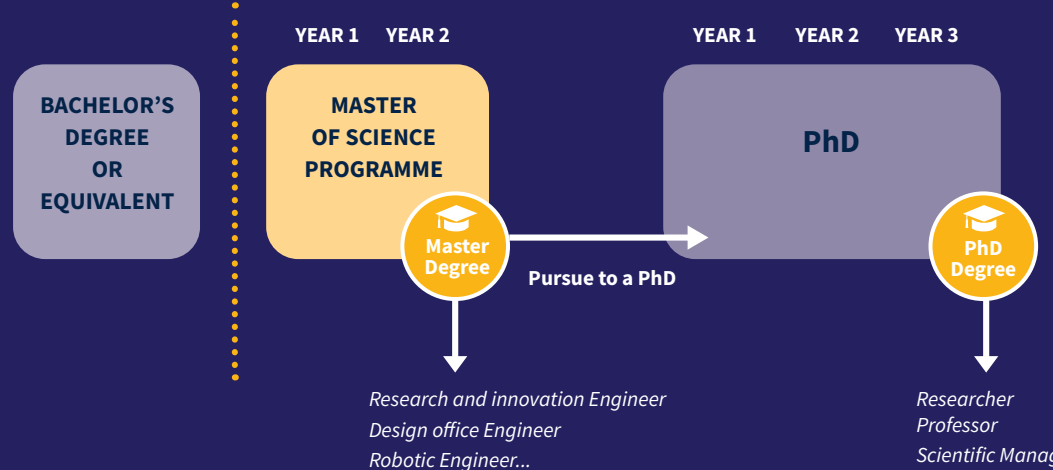
*NB: course content may be subject to minor changes*

The last semester of the master's programme is set aside for the master's thesis

### What sets our PhD track apart

- ✓ Tailored training opportunities — Gain exclusive access to specialist workshops and courses designed to enrich your doctoral journey.
- ✓ Financial support for international mobility — Dedicated funding to help you attend conferences, collaborate abroad, and broaden your academic horizons.
- ✓ A dedicated point of contact — Benefit from close guidance from a programme lecturer, complementing the support of your thesis supervisors.
- ✓ A say in programme life — PhD students can propose and co-organise events with faculty and administrative staff.
- ✓ A mentoring role — PhD students have the opportunity to guide and support Master's students throughout their studies
- ✓ And joining LS2N means more than pursuing a PhD — it is a chance to build a strong academic profile, grow your professional network, and open doors in both academia and industry.

## Integrated Master-Phd Track



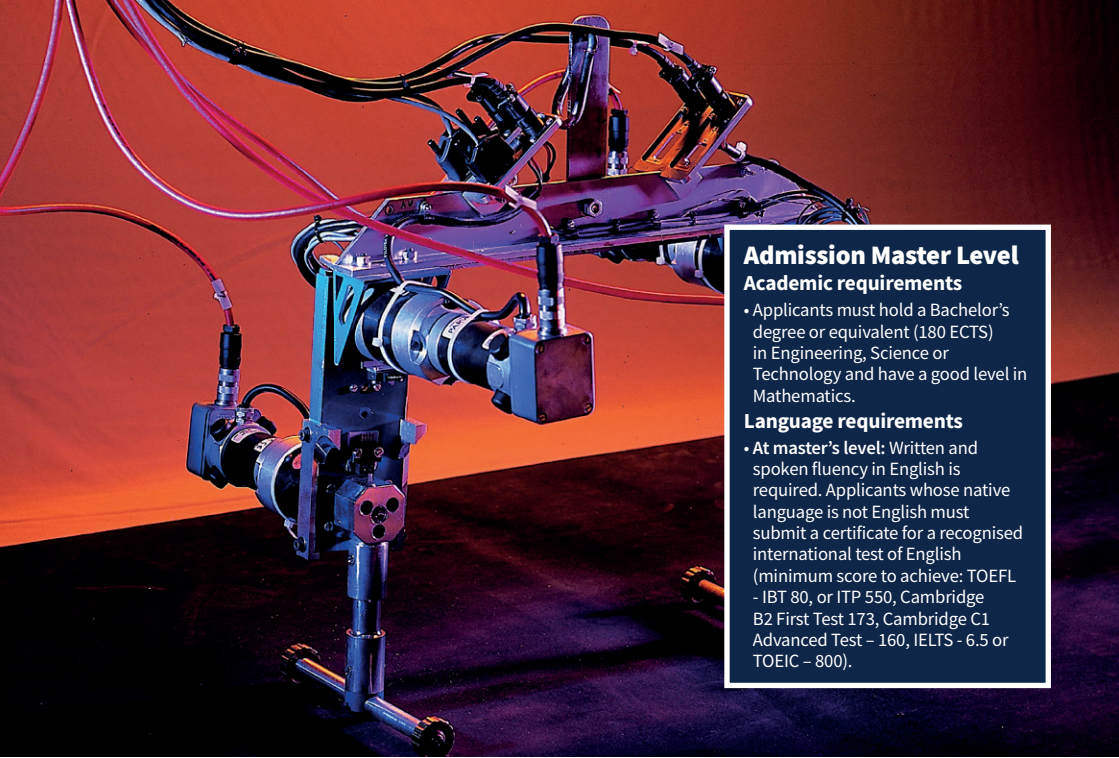
### Career Opportunities

#### Sectors

Aeronautics, Automotive, Transportation, Wind and Marine Energy, Materials Producers, Consulting, healthcare and construction.

#### Fields

Robotics and Automation, Artificial Intelligence, Autonomous Systems, Computer Vision, Control Systems, Research and Innovation in Robotics.



### Admission Master Level Academic requirements

- Applicants must hold a Bachelor's degree or equivalent (180 ECTS) in Engineering, Science or Technology and have a good level in Mathematics.

### Language requirements

- At master's level: Written and spoken fluency in English is required. Applicants whose native language is not English must submit a certificate for a recognised international test of English (minimum score to achieve: TOEFL - IBT 80, or ITP 550, Cambridge B2 First Test 173, Cambridge C1 Advanced Test - 160, IELTS - 6.5 or TOEIC - 800).

REINVENT ENGINEERING



### Contact

Programme coordinator

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