CENTRALE LYON

International Master Nanoscale Engineering

Degree level: Master
Training time: 2 years
Language: English
Status: Student
Campus: Lyon-Ecully Campus

Objectives

Nanoscience is the study of matter at the nanoscale, where materials exhibit unique properties such as enhanced surface area and quantum effects. These properties are essential for advanced fields like nanophysics, nanoelectronics, and nanomedicine, offering groundbreaking applications in technology, healthcare, and material science.

The nanoscience and nanotechnology master's program offers the opportunity to explore **nanotechnologies** in a stimulating scientific and cultural environment. This multidisciplinary and international program is designed for students wishing to pursue an academic or industrial career.

In two years, the curriculum provides a solid theoretical foundation and practical expertise in **fabrication, characterization and design of structures and systems** at the nanoscale. Graduates are trained to lead innovative projects at the interface of these cutting-edge disciplines.

With a strongly international focus, this master's program welcomes **over 70% international students**, and courses are taught entirely in English. Numerous **international scientists of international renown** are also invited to give seminars throughout the year.

The course is supported by Centrale Lyon, INSA Lyon and the Université Claude Bernard Lyon 1.

Program

This Master's program in Nanoscience and Nanotechnology is a two-year (120 ECTS credits) curriculum that offers specialized training in **physics**, **nanomaterials**,

nanoelectronics, and **nanobiotechnology**.

Taught in English, the program provides options to tailor the students' specialization.

This master's degree integrates immersion in a **high-quality research environment**, with **practical work** and **projects conducted** in nanotechnology laboratories and companies. Additionally, it addresses **ethical** issues, the **societal impact** of nanotechnology and **commercial considerations** through specialized seminars and courses.

Discover the course syllabus

First year

This year is primarily dedicated to common and optional **lecture courses**. From the outset, students begin a **group research project** in collaboration with a laboratory associated with the master's program. Practical **work** and **mini-projects** facilitate the transition to the second semester, when students complete a **internship** of at least seven weeks in a research group. Seminars led by experts from academia and industry further enrich the program.

Semester 1

Common scientific core units

- Micro and nanofabrication - part 1
- Characterization tools for nanostructures
- Surface physics
- Research Project 1

Elective core units

- Fundamental bases of science
- Biomolecules, cells and biomimetic systems
- Quantum engineering

Semester 2

Common scientific core units

- Micro and nanofabrication - part 2
- Intercultural studies
- French or English as a foreign language
- Research Project 2

Elective core units

- Nanomechanics
- Introduction to system design
- Drug delivery systems
- Physics of Semiconductors - part 1

View the detailed curriculum of the first year (M1)

Second year

This year focuses on **specialization** and **skill development** for students. It also includes the completion of a **thesis project** lasting 5 to 6 months, which may take place in a research laboratory or a company.

Semester 3

Scientific core units

Students must choose at least three courses from the following selection for their second year:

- Micro, nano-photonics and applications
- Bioengineering
- Surface analysis techniques
- Functional materials
- Emerging technologies for nanoelectronics and information technology

Elective core units

- Nanotechnology for energy and the environment
- Semiconductor Nanostructures
- Computational modeling of nanoscale systems
- Micro- and nanofluidics

Transversal core units

- French or English as a foreign language
- Intellectual Property

Semester 4

The final semester is dedicated to the Master's thesis project, which can be conducted in an academic research laboratory or in an industrial setting. Students have the option of complete their thesis project in France or abroad.

View the detailed curriculum of the second year (M2)

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Career opportunities

Career prospects after training : Graduates may pursue PhD studies or join high-tech companies in France or abroad, such as Thalès, CEA, STMicroelectronics.

Doctoral studies and scientific careers : The majority of graduates choose to pursue doctoral studies. There is high demand for master's-level teaching staff and early-career scientists at the start of their careers.

Corporate opportunities : Graduates can find opportunities in sectors such as **electronics**, **materials** (development and applications), **biotechnology** (analysis and pharmacology), as well as **tools and processes** (characterization and process development).

Focus

The nanoscience and nanotechnologies master's degree is supported by renowned institutions: Centrale Lyon, INSA Lyon and Université Claude Bernard Lyon 1. Students benefit from access to state-of-the-art nanotechnology platforms and infrastructures, such as cleanroom or electron microscopes, with a total technological investment exceeding 10 million euros. These resources are fully dedicated to their experimental work and practical training.

All courses, practical work, internships and thesis projects are carried out in close collaboration with Lyon-based research laboratories, including the Lyon Institute of Nanotechnology.

Admission requirements and application

Pre-requisites

- Master 1: Bachelor in Science (preferably in Physics, Chemistry, Electronics, Materials Science, Bioengineering, Mechanical Engineering). English proficiency: B1 level
- Master 2: Completion of Master 1 in a subject related to the Master's topics. Certified B1 level in English (CEFRL)

Application

Applications are considered on the basis of a portfolio.

Discovering master's tuition fees

Tuition fees

Knowing and anticipating your expenses is essential before making a serene commitment to training.

Discover master's tuition fees Discover the average study budget at Centrale Lyon

Administrative contact

Education department - International Masters

Information and registration

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Educational contacts

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Useful link

- Learn About the Training Structure