REINVENT ENGINEERING

CENTRALE NANTES

Master's Programmes

Master of Science (MSc) programmes

Erasmus Mundus Joint Master Degrees

Integrated Master-PhD Track

Explore our Masters and find the perfect one for you:
Just click on the name of the programme to go straight to the right page!

OUR MASTER'S PROGRAMMES

A word from the director

Drawing on over **one hundred years of history**, our mission at Centrale Nantes is to '**reinvent engineering**'. We proudly uphold the tradition of French engineering schools (grandes écoles d'ingénieurs) by providing world-class training in science and technology.

As a member of the prestigious Ecoles Centrale Group and a founding member of Nantes Université, Centrale Nantes offers an exceptional educational experience through a rigorous, high-quality curriculum. Our strong commitment to **academic excellence and sustainable development** ensures that students are well-prepared to meet the ever-evolving demands of today's global job market and to address the key challenges of ecological transition.

Beyond our high-quality teaching, Centrale Nantes is at the forefront of cutting-edge research. Our faculty's pioneering research directly informs the curriculum, ensuring **students are exposed to the latest advancements in science and technology**. This integration guarantees a high-quality learning experience, with a focus on innovation and real-world applications.

At Centrale Nantes, you will be part of a **diverse and innovative community**, gaining valuable skills and hands-on experience that will empower you to **shape the future of engineering**.

Study at Centrale Nantes

A world of opportunities

International students comprise around 40% of the total student body (92% of master's students), bringing a truly global perspective to Centrale Nantes, whose Nantes campus is home to over 80 different nationalities. We are committed to providing **a welcoming, supportive, and inclusive environment** for students from around the world.

To make studying at Centrale Nantes more accessible, we offer **a range of tuition fee waivers and early enrolment tuition fee reductions** for international students, ensuring that talented individuals from diverse backgrounds can thrive in our community. We also give you the opportunity to **join and interact with our student community online as soon as you receive your admission offer**. Once enrolled you'll be part of the Centrale Nantes Alumni network bringing together over **20,000 graduates and students**.

Centrale Nantes in the Rankings

- **125th in the world** (5th in France) for **Mechanical Engineering** in the QS World University Rankings by Subject 2024
- **4th** in the 2024 Etudiant rankings of **French engineering schools**
- **World's top 300 for Engineering** in the Times Higher Education World University Rankings by Subject 2024
- **Top 5** in the 2024 ranking of engineering schools most committed to **ecological transition**, compiled by Les Echos START and ChangeNOW

100 years of history

For over a century, Centrale Nantes has **continuously evolved to meet the changing demands of society and industry**. Founded in 1919 as the 'Institut Polytechnique de l'Ouest', it became the 'École Nationale Supérieure de Mécanique' in 1948, focusing on mechanical engineering to support key national sectors like shipbuilding, metallurgy, and aeronautics.

In 1991, the school rebranded as Centrale Nantes, broadening its curriculum to prepare engineers equipped not only with a **strong scientific and technical foundation** but also with a **commitment to addressing global challenges**.

Today, Centrale Nantes continues to embody a spirit of exploration and innovation, with research and programmes focused on: **energy transition, industry of the future, and engineering for health**, each deeply rooted in the expertise of its laboratories. This adaptability and dedication to societal needs have established Centrale Nantes as a leader in engineering education and research.

Student life

As indicated by our 'Bienvenue en France' (Welcome to France) award we attach great importance to **making you feel welcome** at Centrale Nantes. As soon as you receive your admission offer you'll have the opportunity to join and interact with our student community online. **Our International Relations Team are on hand**, together with the Accents International Student club, **to facilitate your arrival**. They will help you find accommodation, pick you up at the airport or train station, and provide support for your administrative procedures.

To help you settle in, you'll be able to **participate in events** organised especially for international students, as well as the wider and particularly **dynamic student life on campus**. With over 110 student clubs and associations, there's something for everyone from sports to theatre to humanitarian activities, and so on.

Centrale Nantes is committed to diversity, equality and inclusion for its staff and students. Our goal is to ensure that everyone is free to embrace their differences and identity without fear of scrutiny from others and to maintain equality and respect for all. In addition to our on-site infirmary for preventative medicine and first aid, all students have access to a free remote counselling service if needs be.

>2000
students
on campus

Campus

Centrale Nantes houses 17 buildings on a 40-acre **green campus alongside the River** Erdre. Located next to Nantes Université campus, it is only a 15-minute tram ride into the city centre. In addition to the standard facilities of a campus, it is home to **13 research platforms, a business incubator and modern sports amenities** including a gymnasium, squash courts, climbing wall and an artificial sports pitch.

Centrale Nantes has an **ongoing partnership with a number of private student residences** located close to the campus. Our International Relations team can book accommodation on behalf of new incoming international MSc students.

Focus on Sustainable Development and CSR

Centrale Nantes is strongly committed to sustainable development and corporate social responsibility (CSR), with regard to its **academic and research activities** as well as its own impact.

> **Strategy & governance**
Centrale Nantes places sustainable development at the heart of its strategy and actively involves both students and staff in initiatives on campus.

> **Education**
Our students are taught about the issues and challenges of sustainable development, with this dimension integrated into every course of study.

> **Research**
Centrale Nantes's research and innovation activities are focused on energy transition, the industry of the future, renewable energies, low-carbon materials, decarbonisation of transport, etc.

> **Campus management & environment**
A policy of reducing emissions and resource consumption has already been implemented: waste management, responsible purchasing and travel, etc.

> **Social impact**
A quality of life policy for the school is already in place, as is a plan to guarantee equal opportunities in education, research and human resources.

Nantes

The city of Nantes is home to **60,000 students**, drawn by the **quality of life and strong employment prospects** in France's sixth largest city. Compared to other major French cities like Paris or Lyon, Nantes offers a more affordable cost of living. Nantes stands out as a European Green Capital and FrenchTech Capital.
The city has a rich cultural scene, with museums, festivals, and unique attractions like 'Les Machines de l'Île'.
One hour away from the Atlantic coast and only **two hours from Paris** by train, Nantes is easy to reach from all over the world!

Reinventing engineering through Research

> Research at Centrale Nantes is conducted across 6 research laboratories and draws on a number of **strong industrial and institutional partnerships** to develop academic and applied research of the highest standards.

> **With 13 experimental platforms on campus, Master's students have access during their practical classes and for research projects** to equipment such as ocean engineering tanks, engine and vehicle test benches, a supercomputer facility and platforms for additive manufacturing and biofabrication, autonomous vehicles and drones, micrometeorology and wind engineering, etc.

> Research activities focus on three major challenges for growth and innovation: energy transition, industry of the future, and engineering for health.

ENERGY TRANSITION
> Energy production (MRE), storage and transport
> Energy and engines (electric, hybrid, hydrogen)
> Life cycle of materials
> Habitat, environment, cities
> Smart grids & power systems

INDUSTRY OF THE FUTURE
> Composite materials
> Robotics
> Factory of the future
> AI
> Additive manufacturing

ENGINEERING FOR HEALTH
> Signal and image processing
> Bio-engineering, machine learning
> Bio-fabrication

Building the future of sustainable construction

Centrale Nantes and EDYCEM are advancing sustainable construction through their **long-standing industrial research chair**. The chair currently focuses on three strategic areas to reduce the environmental impact of concrete design: developing low-clinker concretes and promoting low-carbon solutions, leveraging artificial intelligence to predict the behavior and durability of new-generation concretes, and exploring pavement surfacing to mitigate urban heat islands. This partnership underscores Centrale Nantes' **commitment to advancing eco-friendly construction materials and methods**.

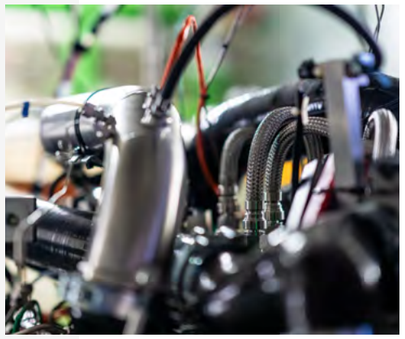
Driving innovation in sustainable transport

> *Mervent 2025 – reducing carbon emissions in commercial shipping*

The project aims to design, build and operate the first container ship powered by hybrid sail/synthetic fuel which will halve CO^2 emissions, by 2026. The LHEEA laboratory at Centrale Nantes is focusing on energy efficiency, including energy modeling, **optimizing energy management strategies for sail-powered vessels, and experimental carbon capture characterization**. This innovative vessel is scheduled to undergo sea trials in 2025.

> *HyMot – decarbonizing light commercial vehicles*

Centrale Nantes is working alongside industry leaders to convert the internal combustion engines of light commercial vehicles to hydrogen propulsion. The school's research teams are contributing through the **development of digital models and tests on a real prototype engine** to optimize engine architecture and technical applied solutions, aiming **to enhance performance and reduce emissions**. A prototype vehicle has already been tested in Germany.



Powering sustainable energy

> *GENIUS - Developing a test platform for the production, storage and use of green hydrogen*

With €2.8 million in funding, the GENIUS project underway in the LS2N Laboratory at Centrale Nantes aims to develop a **full-scale test platform for integrating fuel cells and electrolyzers with seasonal hydrogen storage**. This platform will support applications in both transportation, particularly electric vehicles, and stationary uses, such as buildings and low-voltage networks. The GENIUS project aligns with the region's hydrogen roadmap and reinforces Centrale Nantes' commitment to advancing sustainable energy technologies.

Alumni

Centrale Nantes Alumni (CNA) brings together over **20,000 students and alumni** from Centrale Nantes: students and graduates from across the bachelor, engineering, masters and PhD programmes.
CNA helps students with workplace integration: mentoring, internship and job opportunities, regional, international and profession-focused conferences.
500 events are organised each year and 3,000 job/ internship offers are shared on the network's platform.
The power of the network lies in a strong sense of belonging, in the values of mutual aid and solidarity shared by more than **120,000 'Centralien' graduates from Nantes, Lille, Lyon, Marseille and Paris**; to accompany each 'Centralien' throughout their career.

Careers and Employment Prospects

Students benefit from **individual careers guidance** from the Careers Team at Centrale Nantes. Face-to-face or online careers sessions, mentoring sessions with graduates, webinars, online forums, etc. help future graduates to find their path.
2/3 of our Master's graduates remain in France for their first job or PhD, the majority of whom being taken on by the company where they completed their Master's thesis.
France offers **excellent prospects for non-European students who wish to remain in the country after completing their Master's degree**. Graduates can secure the right to stay if they have a job offer with a salary of at least 1.5 times the legal minimum wage. Additionally, graduates without an immediate job offer can apply for a special residence permit, valid for a minimum of 12 months, to allow them time to find employment or start a business.

Learn French – Apprenez le français
Whilst there is **no requirement to speak French** in order to apply for a Master's programme at Centrale Nantes, all of our programmes include **French language courses for international students**. The objective is for students **to learn general French**, and develop oral and written comprehension and expression skills. Another key objective of this course is **to introduce students to French culture**. Students will gain the ability to communicate simply but clearly in both spoken and written French, making everyday interactions easier and helping them integrate seamlessly into their future professional and social environments.

Overview

Looking for a world-class Master's in engineering, taught in English?

Centrale Nantes offers 4 Master of Science (MSc) programmes with **a choice of specialisms** for M1 and M2 entry as well as Erasmus Mundus Joint Masters - which highlight the excellence of the teaching on our master's programmes in:

> **Marine Technology**
> **Civil Engineering**
> **Mechanical Engineering**
> **Control and Robotics**

The MSc programmes are taught in English over two academic years comprising three study semesters followed by a paid Master's thesis / internship in the final semester. All of our Master's programmes are fully accredited by the French Ministry of Higher Education and Research and give full access to PhD programmes anywhere in the world. Attractive funding opportunities are available for students enrolling in a MSc Programme at Centrale Nantes.

Erasmus Mundus Joint Masters

Centrale Nantes is also currently involved in seven Erasmus Mundus Joint Masters (EMJMs) - prestigious international study programmes, jointly delivered by an international consortium of higher education institutions. Each EMJM programme involves study periods in two or more countries.

5 Erasmus Mundus Joint Masters are available for the September 2025 intake:

> **European Master on Control of Renewable Energy Systems - EU-CORE**
> **International Master in Electric Vehicle Propulsion and Control - E-PiCo+**
> **European Master in Dynamics of Renewables-based Power Systems - DREAM**
> **Master in Mechanics of Sustainable Materials and Structures - MS²**
> **International Master in Advanced Design of Sustainable Ships and Offshore Structures - EMship**

EU-funded and consortium scholarships are awarded to the best candidates applying under annual selection rounds.

The application process is different for each programme. Please consult each programme page.

Integrated Master-PhD Track

Centrale Nantes offers high-potential students the opportunity to join our 'two plus three'-year Integrated Master-PhD Track. **This track draws on the areas of excellence of our research institutes and our existing MSc programmes**. It is designed to give students **wider exposure to research activities** during their two-year Master's programme - ideal preparation for those who wish to pursue their studies for a further three years at PhD level.

Years one and two are designed to equip students with the skills and facilities they need to tackle a challenging research project alongside their MSc courses.

After successful completion of the Master's degree, students on this track would naturally progress towards PhD studies within the school, subject to final acceptance by the ad hoc committee and the award of a PhD grant. The student is, of course, also free to pursue other avenues in academia or industry.

There is no need to apply for the track before arriving at Centrale Nantes for your Master's programme. Your choice will be taken into account during the first year of the Master's programme so as to orient your laboratory research activities and the choice of elective modules towards the PhD thesis subject.

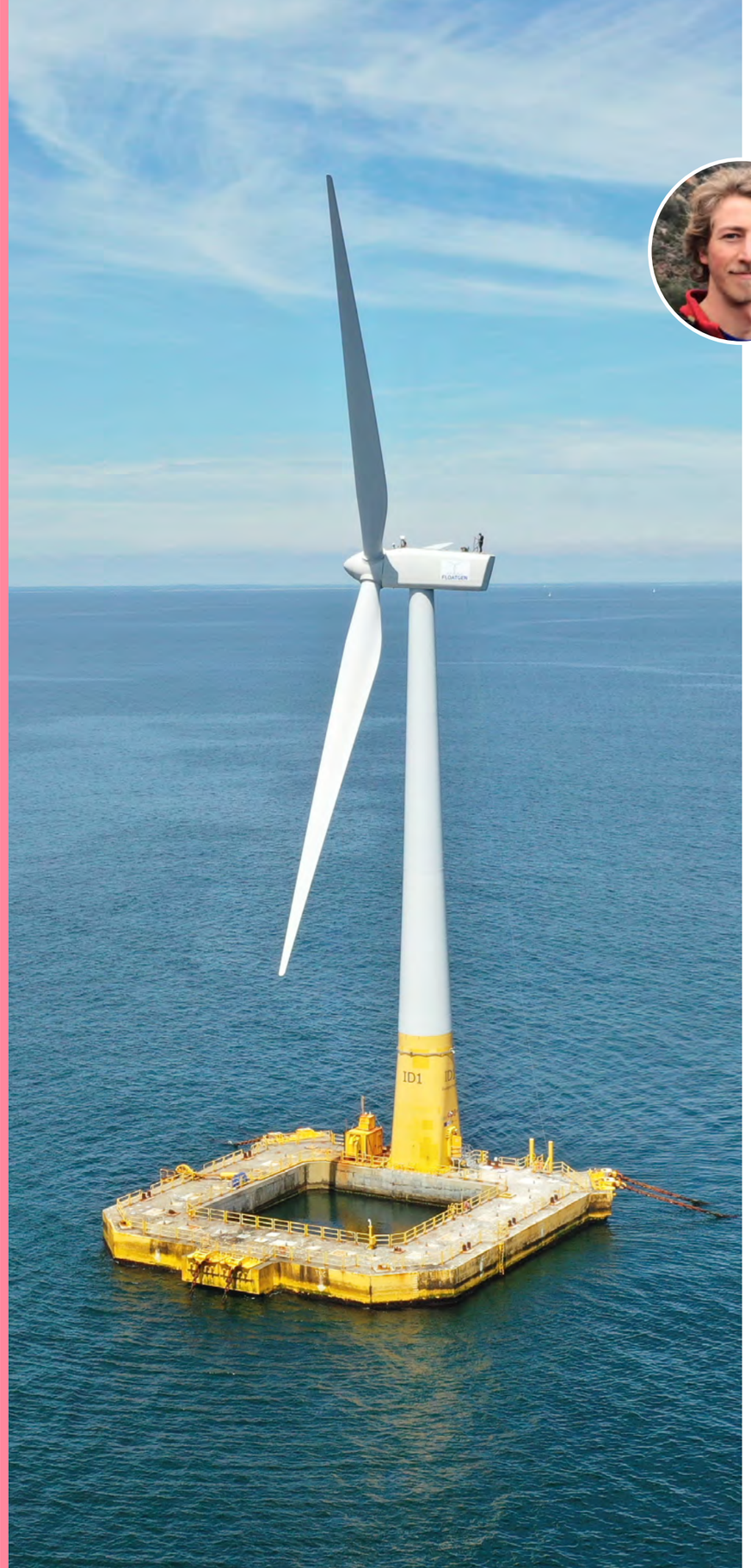
One intake per year
All of our Master's programmes commence with a Welcome Week in early September each year.

Marine Technology

MSc HYDRODYNAMICS FOR OCEAN ENGINEERING
HOE

MSc ATLANTIC MASTER ON SHIP OPERATION & NAVAL ENGINEERING
AMASONE

INTERNATIONAL MASTER IN ADVANCED DESIGN OF SUSTAINABLE SHIPS AND OFFSHORE STRUCTURES
EMSHIP



HADEN - CLASS OF 2021 - USA

What is your background?
I am from Northwest Arkansas, a southern state near the center of the United States. In 2019, I completed a bachelor's in Civil Engineering at the University of Arkansas. During my undergraduate years, I participated in various design projects in structural and mechanical engineering through internships and research. I realized that it was essential to me to participate in fabrication and testing as well as design.

Why did you decide to join the AMASONE Master Programme at Centrale Nantes?
The Master in Naval Engineering offered by Centrale Nantes emphasized **onboard training** as well as **hydrodynamic and naval architecture** courses. The **diversity of the program** is what appealed to me.

What did you enjoy or find challenging about the programme?
My favorite part about the program was **studying at three different schools**: Centrale Nantes, Ecole Navale and ENSM. This offered **three unique perspectives on the naval industry**: research, military, and Merchant Marine.

What is your current position?
Currently I am **Head of Engineering at MMProcess in Saint-Pierre-Quiberon**. We are naval engineers/architects specializing in composite design and prototyping for performance sailing and foiling vessels.

How did this Master's programme help prepare you for your current position?
Project-based courses in my masters helped prepare me for real-world projects. The masters program opened many doors and helped me to integrate the naval industry in France.

Any advice for future applicants?
My advice for future applicants would be to integrate as much as possible with the French students and learn French!

Centrale Nantes in three words?
Research - Innovation - Diversity

Master of Science (MSc)
Marine Technology | M-TECH HOE

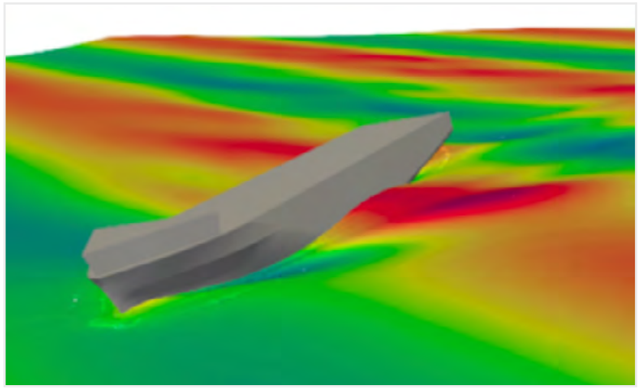
HYDRODYNAMICS FOR OCEAN ENGINEERING

OBJECTIVES

This specialism in Marine Technology aims to give students advanced training on typical problems of free-surface hydrodynamics applied to ocean engineering: water waves, ship resistance, wave-structure interactions, moorings, behaviour and performance of marine structures including ships or offshore renewable energy systems... physical, modelling, numerical and experimental aspects are studied.

Training involves **theoretical courses** together with **physical understanding, modelling and the practical use of software to solve problems** through a variety of numerical methods e.g., boundary elements or spectral methods under potential flow theory, finite-volume techniques in solvers for viscous flows, Smooth Particle Hydrodynamics (SPH).

Experimental methods are also taught **through lab work using the unique academic large-scale facilities** available at Centrale Nantes including **a towing tank, a large ocean wave tank** equipped with a multiflap wave generator and a circulating water channel.



SKILLS

Specialism-specific

> Build and use models dedicated to hydrodynamics for ocean engineering
> Define and perform experiments for free-surface hydrodynamics problems
> Solve numerically free surface problems for ocean engineering applications

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: Naval Industry, Renewable Energy, Classification societies, Research and Innovation, Consulting.

FIELDS: Marine Renewable Energies, Maritime Transportation, Offshore Engineering, Naval shipyards, Coastal engineering.

JOB POSITIONS: Research and Innovation Engineer, Design Office Engineer, Exploitation Engineer, Mechanical Engineer.

PHD OPPORTUNITIES: in the LHEEA lab at Centrale Nantes or in other labs for experimental and / or numerical studies, often in cooperation with industrial partners.

FACULTY, INDUSTRIAL PARTNERS AND RESEARCH LABS

This MSc relies on the Centrale Nantes' faculty, staff and research facilities of the LHEEA Laboratory. Centrale Nantes has several industrial partnerships such as with Bureau Veritas, Principia, H&T, Innosea, Mauric, CMA, CGM, D-ICE, Ideol, Chantiers de l'Atlantique, Technip, Saipem.

EXAMPLES OF FINAL YEAR INTERNSHIP/ MASTER'S THESIS

> Fatigue Methodology of Floating Offshore Wind Turbine Platform & Tower in Composite Materials, ***Bureau Veritas Marine & Offshore***
> Speeding Up Simulation-Driven Design for a High-Speed Planing Boat, ***Friendship Systems***
> Development of methodology for predicting marine vessel turning radius with overset grid technique using CFD Solver, ***Mauric***
> Floating offshore wind turbine model validation and parameter estimation, ***University of New Hampshire***
> Design floating wind turbine alternate mooring system, ***IDEOL***

INTEGRATED MASTER-PHD TRACK
Students applying for this specialism can also apply in their first year to join the Integrated Master-PhD track, which brings together the two years of the Master's degree and three years of PhD studies. The Integrated Master-PhD track is designed to give high-potential students exposure to research activities from the M1 year.

WHY CHOOSE THIS MSc?
> Well-respected scientific expertise in hydrodynamics research activities
> Practical lab work in the experimental test facilities
> Centrale Nantes is ranked 41st in the world with Nantes Université for Marine/Ocean Engineering according to the Shanghai Global Ranking of Academic Subjects 2023

Learn more: *ec-nantes.fr/study/masters/hydrodynamics-for-ocean-engineering*

Master of Science (MSc)
Marine Technology | M-TECH AMASONE

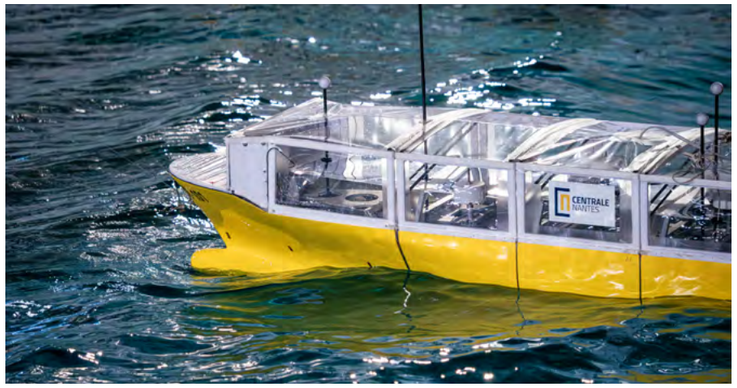
ATLANTIC MASTER ON SHIP OPERATION AND NAVAL ENGINEERING

OBJECTIVES

Through this programme students will develop skills in naval engineering to become engineers experienced in ship operations.

Two of the top French Technical Universities (Ecole Navale in Lanvéoc-Poulmic and Centrale Nantes) have teamed up to offer you a **unique programme**. The outstanding strength of this MSc programme is that you will have **on-board training sessions on French Navy vessels**.

The insight gained into on-board practices, use of complex equipment and immersion into rapidly evolving knowledge and techniques is highly valuable for a naval engineer, and of course, highly regarded by industrial employers. The **M1 year** is taught wholly on the **Centrale Nantes** campus. Students will move to the Ecole Navale site in Lanvéoc-Poulmic, near the city of Brest, for the first semester of the M2 year.



SKILLS

Specialism-specific

> Model and understand the concepts of naval hydrodynamics
> Master the energetic and propulsion systems on ships
> Integrate the human and technical constraints of operational maritime implementation

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: Marine, Energy.

FIELDS: Ship building and naval architecture, naval engineering, offshore engineering companies.

JOB POSITIONS: Mechanical Engineer, Process Engineer, Design Engineer, Marine Systems Management, Research and Innovation Engineer (post PhD).

EXAMPLES OF FINAL YEAR INTERNSHIP/MASTER'S THESIS

Container maintenance and repair assistant, ***CMA CGM***

Dynamic analysis of shaft lines, ***Naval Group***

Installation methods in Subsea Engineering Team, ***Saipem SA***

Contingency management in an offshore substation production workshop, ***Chantiers de l'Atlantique (shipyard)***

FACULTY, INDUSTRIAL PARTNERS AND RESEARCH LABS

> This MSc relies on the Centrale Nantes' and Ecole Navale's faculty and staff, and the research facilities of the LHEEA laboratory and the IRENav institute. Our external partners include MAN Energy Solution France, ENSM.
> École Navale in Lanvéoc-Poulmic close to Brest is the French Naval Academy where French Navy officers are trained. In Ecole Navale, students receive top notch scientific training and navigation knowledge in the maritime environment.
> At Centrale Nantes, students will have access to experimental facilities such as a towing tank, a wave tank and engine test benches.
> Students spend a substantial amount of time on both sites: Lanvéoc-Poulmic (around 30 ECTS) and Nantes (around 60 ECTS) over the 2 years of the programme.

WHY CHOOSE THIS MSc?

> Advanced naval engineering training: navigation training in a simulator and marine operations onboard ship.
> Unique research level lab work in the experimental test tank facilities
> Centrale Nantes is ranked 41st in the world with Nantes Université for Marine/Ocean Engineering according to the Shanghai Global Ranking of Academic Subjects 2023

Learn more: ec-nantes.fr/study/masters/atlantic-master-on-ship-operation-naval-engineering

Erasmus Mundus Joint Master
International Master

EMship - Advanced Design of Sustainable Ships and Offshore Structures

Co-funded by the European Union

EMship aims to provide **high quality education in Naval Architecture and Ship & Offshore Design**, through a 2-year programme, which is fully taught in English with **mobility in a minimum of two European countries**.

EMship welcomed its first students in 2010, under the Erasmus Mundus European Programme of Excellence label. The programme was selected in the Quality Review in 2015, a grant awarded by the EACEA in the framework of the Erasmus Mundus Joint Master Degree Programme. In 2019 EMship was extended to welcome four additional cohorts under the Erasmus Mundus Joint Master Degree label. In 2023 the programme was extended for another four cohorts.

COURSE CONTENT

The programme is a two-year master's course, fully taught in English, consisting of four semesters of study (120 ECTS). Student mobility is compulsory - each student must spend time at a minimum of two universities.

Students spend their first two semesters at either Ghent University, Belgium or Universitatea Dunărea de Jos, Romania. For the third semester students can choose between Centrale Nantes, University of Rostock in Germany, Instituto Superior Técnico Lisboa, Portugal, Université de Liège, Belgium or Universidad Politécnica de Madrid, Spain. The master's thesis/ internship in the final semester can be undertaken under the supervision of the same institution or at a partner university.

ADMISSION CRITERIA

The EMship programme is open to holders of a university degree (Bachelor of Science or equivalent) who are able to follow the programme in English. All candidates must have relevant background in:

> **Mathematics, numerical analysis, basics in computer programming**
> **Solid mechanics, structural analysis, mechanics of materials, dynamics of mechanical systems**
> **Applied thermodynamics, fluid mechanics**

TUITION FEES

Between €4,500-9,000 per year (see the website for more details)

See the programme website:
https://emship.eu

ERASMUS MUNDUS SCHOLARSHIPS

Students from all over the world are eligible for an Erasmus+ Erasmus Mundus Joint Master (EMJM) scholarship. The number of scholarships awarded may vary annually. Erasmus Mundus scholarship recipients are not liable for tuition fees and receive approx. €1400 per month to cover travel, visa, installation and subsistence costs.

CONSORTIUM SCHOLARSHIPS

A number of Consortium scholarships are awarded by the consortium to students who did not obtain an Erasmus+ EMJM scholarship, but whose quality of application stood out. This scholarship will consist in a 50% reduction in tuition fees.

HOW TO APPLY

Application deadlines:

> Students applying for Erasmus+ EMJM and Consortium scholarships: **31 January 2025**
> Self-funded students: **31 March 2025** (if visa required) or **31 May 2025** (if no visa required)

Apply online: *https://emship.eu/how-to-apply/*

CONSORTIUM

The EMship consortium comprises 7 institutions across Europe, two of whom host M1 programme students and a five who host M2 programme students and confer the joint master's degree:

> **Ghent University, Belgium (co-ordinator)**
> **Universitatea Dunărea de Jos, Romania**
> **Universität Rostock, Germany**
> **Centrale Nantes, France**
> **Instituto Superior Técnico Lisboa, Portugal**
> **Universidad Politécnica de Madrid, Spain**
> **Université de Liège, Belgium**

CAREER PROSPECTS

At the end of the Master's programme, there is a **wide range of career opportunities** that lead to jobs in production (shipyards), in business (part suppliers: propulsion, dredging, ships specialised in windmill transport, etc.), in research institutes (ship model basin (HSVA)), CMT (naval technology, etc.), certification companies (BV, DNV-GL, LR, etc.) **as well as in academia working towards a PhD**. Current experience is that **98% of graduates find a job in Europe or their home country within 6 months**.

Typical career opportunities: ship and marine structure design, numerical simulation for fluids and structures, marine renewable energies, building and maintenance in shipyards, safety and sustainability management.

Civil Engineering

MSc MATERIALS AND STRUCTURES IN THEIR ENVIRONMENT
C-ENG MSE

EUROPEAN MASTER IN MECHANICS OF SUSTAINABLE MATERIALS AND STRUCTURES
MS²

RANA - CLASS OF 2019 - LEBANON

What is your background?
I completed my bachelor's degree in civil engineering at the Lebanese university and in parallel for my last year of bachelor, I enrolled in the double degree program with Centrale Nantes where I obtained my master's degree in the research program entitled "Materials and Structures in their environment". **I did my PhD here in Centrale Nantes** in the Research Institute in Civil and Mechanical engineering (GeM).

Why did you choose Centrale Nantes for your MSc Programme in Civil Engineering?
I chose Centrale Nantes for my master's degree due to its **outstanding reputation in terms of teaching quality and commitment to innovative research**.

When and why did you decide to pursue your PhD here?
During my internship here within the geo-mechanic team here in GeM Lab, I really enjoyed the field of research and I was convinced that 5 months of internship were not enough to satisfy my passion for research. That's why I decided to pursue with the PhD that was proposed to me as a continuation to my internship.

What did you work on for your PhD?
The aim of my PhD thesis was to investigate the response of a deformable porous skeleton percolated by an unstable bi-phasic flow, as the one that occurs deep down in the underground geological reservoir, within the context of CO2 sequestration, for example, or the underground storage of hydrogen or methane produced from the green energy.

What are you doing now?
Currently, I am **a post-doctoral researcher**, always here in GeM Lab, continuing my research activity on the drainage phenomenon within the sand medium.

Any advice for future applicants?
I highly encourage Master's students to pursue a PhD because it's a one-of-a-kind experience filled with building up many skills such as communication, management, teaching and analytical proficiency.

Centrale Nantes in three words?
I would say International and multi-cultural, Research-driven, and sustainable.

Master of Science (MSc)
Civil Engineering | C-ENG MSE

MATERIALS AND STRUCTURES IN THEIR ENVIRONMENT

OBJECTIVES

This specialism in Civil Engineering aims **to develop scientific and technological knowledge on materials and structures in both the public works and industrial sectors**. It is characterized by a high degree of scientific specialisation. The programme focuses on the following specialised areas: natural materials, concrete and structures, and their interactions with the environment, the sustainability of materials, environmental geomechanics, green engineering and, more generally, the physics of multi-scale materials.

SKILLS

Specialism-specific

> Organize and carry out research work to understand a physical phenomenon or a new problem in civil engineering

> Organize, complete and validate an engineering approach to address a specific problem

General

> Act with professionalism, be rigorous and autonomous

> Identify models, perform simulation and analyse results

> Communicate comprehensive results in a meaningful way

> Undertake bibliographic surveys of international research and professional literature

> Manage or be part of a project

FACULTY, INDUSTRIAL PARTNERS AND RESEARCH LABS

> **Laboratories**
This MSc relies on the staff and research facilities of the Research Institute in Civil and Mechanical Engineering (GeM), at Centrale Nantes and Nantes University. Researchers at the Gustave Eiffel University (Nantes) are also involved in the programme. The supporting research institutes have extensive experimental test facilities for static and dynamic characterisation of materials and structures.

> **International collaboration**
Université Libre de Bruxelles and Université de Liège (Belgium), Università degli Studi di Perugia, Università di Roma La Sapienza (Italy), The Hong Kong Polytechnic University, Tongji University (China), Cyprus University of Technology (Cyprus), Alliance of Laboratories in Europe for Research and Technology (ALERT).

JOB PROSPECTS & FURTHER PHD STUDIES

SECTOR: Civil Engineering, Sustainable design, Engineering and environmental geology, Consulting.

FIELDS: Civil Engineering, Design, Research and development.

JOB POSITIONS: Civil Engineer, Environmental Engineer, R&D Engineer.

Recent graduates of this MSc programme choose to pursue their studies with a PhD or started their careers mainly in consulting, as project or research engineers or in academia (post PhD).

EXAMPLES OF FINAL YEAR INTERNSHIP/MASTER'S THESIS

Design of monopile wind turbine foundations, ***Doris***

Permeability evolution of granular soils in an internal erosion context, ***GeM Institute***

Improving the spatial monitoring of rainfalls for flood assessment, ***GeM Institute***

Performance assessment of inerter-based vibration absorbers for deep water fixed-based monopile wind turbines, ***INNOSEA SAS***

Structural Analysis and Design of a Tensegrity Footbridge, ***EIFFAGE BIEP***

INTEGRATED MASTER-PHD TRACK
Students applying for this specialism can also apply to join in their first year the Integrated Master-PhD track, which brings together the two years of the Master's degree and three years of PhD studies. The Integrated Master-PhD track is designed to give high-potential students exposure to research activities from the M1 year.

WHY CHOOSE THIS MSc?
> Preparation for R&D engineering careers in civil and environmental engineering
> Strong links between programme courses and the research topics of the GeM Institute.
> L'Etudiant (2024) ranks Centrale Nantes as the best school in France for civil engineering specialisations.

Learn more: *ec-nantes.fr/study/masters/materials-and-structures-in-their-environment*

Erasmus Mundus Joint Master
European Master

MS² - Mechanics of Sustainable Materials and Structures

This programme is designed to train the next generation of civil engineers with the expertise to design and implement innovative building technologies, with a focus on sustainable materials and structures.
The main objective is to educate future leaders in the development of innovative solutions for sustainability and performance in the built environment by fostering creative and independent thinking and promoting low-impact oriented problem-solving.

This is done by providing a **solid background in fundamental mechanics, coupled with cutting-edge research in innovative materials and structures**, and a research and development environment in the private sector. This blend of solid fundamental skills, innovative research and link to the private sector is the perfect environment to train engineers who are able to provide innovative solutions to the global today's challenges.

The programme, which is taught in English over two years, requires a high degree of mobility since all students will **study in three different countries**: Germany, Italy and France.

COURSE CONTENT

M1 Year - Autumn Semester - TU Dortmund
M1 Year - Spring Semester - University of Trento

M2 Year - Autumn Semester - Centrale Nantes
M2 Year - Spring Semester - Master Thesis

ADMISSION CRITERIA

> Bachelor's degree in the field of civil engineering according to the European Qualifications Framework, or another comparable degree in a comparable course of study of at least three years;
> Proven knowledge of the English language of at least level B2 of the Common European Framework of Reference.

TUITION FEES

Between €3,800-6,800 per year (see the website for more details - the tuition fees are susceptible to slight change.)

See the programme website:
https://www.ms2master.com

ERASMUS MUNDUS SCHOLARSHIPS

Students from all over the world are eligible for an Erasmus+ Erasmus Mundus Joint Master (EMJM) scholarship. The number of scholarships awarded may vary annually. Erasmus Mundus scholarship recipients are not liable for tuition fees and receive approx. €1400 per month to cover travel, visa, installation and subsistence costs.

CONSORTIUM SCHOLARSHIPS

A number of Consortium scholarships are awarded by the consortium to students who did not obtain an Erasmus+ EMJM scholarship, but whose quality of application stood out. This scholarship will consist in a reduction of between €3,000 and 6,000 in tuition fees.

HOW TO APPLY

Application deadlines:
> Students applying for Erasmus+ EMJM and Consortium scholarships: **15 March 2025**
> Self-funded students: **15 June 2025** (if visa required) or **31 July 2025** (if no visa required)

Apply online: *https://www.ms2master.com/how-to-apply*

Co-funded by the European Union

CONSORTIUM

The three partner institutions are:

> TU-Dortmund University - Faculty of Architecture and Civil Engineering | Germany
> University of Trento - Department of Civil, Environmental and Mechanical Engineering | Italy
> Centrale Nantes - Department of Mechanics, Materials and Civil Engineering | France

CAREER PROSPECTS

The program qualifies graduates for research-related and technical professional activities in the areas of

> Advanced Mechanics for Innovative Materials and Structures,
> Materials and Structures under Extreme Conditions,
> Materials and Structures in their Environment.

It also prepares students for Ph.D. studies on advanced research topics related to the mechanics of materials and structures in the field of civil engineering.

Mechanical Engineering

MSc ADVANCED COMPOSITE ENGINEERING AND SCIENCE
M-ENG ACES

MSc ATMOSPHERIC DYNAMICS FOR ENVIRONMENT AND ENERGY
M-ENG ADEE

MSc ADVANCED MANUFACTURING
M-ENG AM

MSc ENERGETICS AND PROPULSION
M-ENG EP

SUDNYA - CLASS OF 2019 - INDIA

What's your background?
Prior to arriving in France, I held a Bachelor's degree in Mechanical Engineering from Mumbai University with almost 2 years of industrial experience.

Why did you decide to join the Master Programme in Energetics and Propulsion at Centrale Nantes?
Centrale Nantes stood out due to its **renowned professors, state-of-the-art research facilities, attractive scholarship allocations, and strong industry connections**. Additionally, France's **attractive financial benefits such as CAF and social security for students** were a compelling factor in my decision.

What did you enjoy or find challenging about the program?
The first year of the Master's program was undoubtedly challenging as an international student adapting to a new culture, language, and academic environment. The core courses in mechanical engineering, including Python programming, tensor calculus, and continuum mechanics, provided a strong foundation.
I particularly enjoyed the courses with industrial partners, which offered **hands-on experience and exposure to simulation software**... Some of my fond memories include gaining hands-on experience on actual engine assembly during labwork, **opening up a Toyota Prius** to understand hybrid and electric powertrains.
The crescendo of the program is a **six-month internship that allows you to apply what you learned in your coursework**.

What is your current position?
Currently, I am completing my PhD at FEMTO-ST on the subject of 'Online embedded integrated Li-ion battery diagnosis' and soon I will be joining Groupe Renault in Paris as a Battery Modeling Engineer.

Any advice for future applicants?
My advice would be to be proactive in seeking research opportunities, attend forums, and events, reach out to your professors they are cool and welcoming. Go out of your comfort zone and immerse yourself in the French culture by interacting with locals and taking advantage of the vibrant student life in Nantes and on Campus.

Centrale Nantes in three words?
Enriching Experience, Hyperconnected to Industries, Internationally Renowned

M2 intake only in 2025/26

Master of Science (MSc)
Mechanical Engineering | M-ENG ACES

ADVANCED COMPOSITE ENGINEERING AND SCIENCE

OBJECTIVES

This specialism in Mechanical Engineering develops skills for providing innovative and optimized solutions in the design and manufacturing of composite materials for research and in industry.

The performance of fibre-reinforced organic-matrix composites and structures are influenced by the constituting materials and the processing stage. Composite mechanical design can be efficiently and optimally performed when one has a good understanding of manufacturing influences and constraints. Therefore, the courses offered in this program will provide a **theoretical and experimental emphasis on the relationships between constituents, processing and structural design**. In addition to theoretical concepts, the course is designed to be practical, thanks to **laboratory work and access to experimental platforms** for the transformation and characterisation of composite materials.

SKILLS

Specialism-specific

> Simulate and optimize composite mechanical design and manufacturing using numerical tools
> Model materials' behavior and physics involved in composite processes
> Characterize and manufacture composite materials

General

> Identify models, perform simulation and analyse results
> Communicate comprehensive results in a meaningful way
> Undertake bibliographic surveys of 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), Consultant (Post PhD)

FACULTY, INDUSTRIAL PARTNERS AND RESEARCH LABS

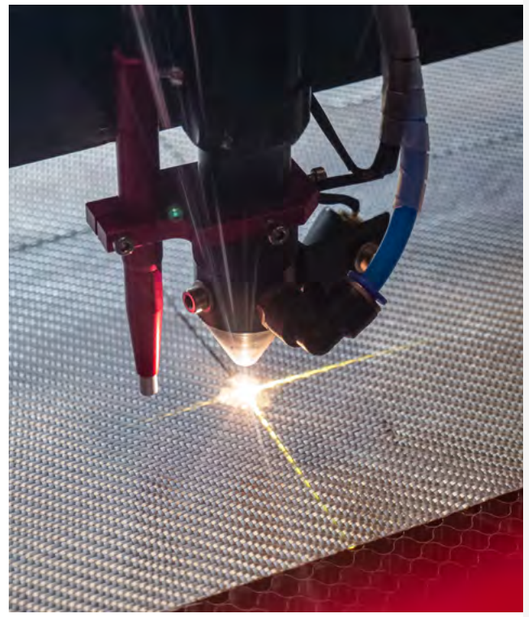
This Mechanical Engineering programme relies on the Centrale Nantes' faculty, staff and research facilities of the Research Institute in Civil and Mechanical Engineering, GeM.

EXAMPLES OF PREVIOUS INTERNSHIPS IN INDUSTRY

> Product design of a composite motorcyclist protection
> Sol-gel functionalization by nano-particle entrapping: a formulation for transparency
> Edge sealing and release agent optimization for aeronautic composite processes

EXAMPLES OF PREVIOUS INTERNSHIPS IN RESEARCH LABS

> Composite design with multi-objective optimisation
> In-situ compression of carbon-fibre reinforcements in X-Ray tomography
> Modelling and characterization of thin film piezoelectric materials



WHY CHOOSE THIS MSc?

> Hands-on composite materials and processes
> Make a career in innovative materials
> Centrale Nantes is ranked 125th in the world for Mechanical Engineering in the QS World University Rankings by Subject 2024

Learn more: *ec-nantes.fr/study/masters/advanced-composite-engineering-and-science*

M1 intake only in 2025/26

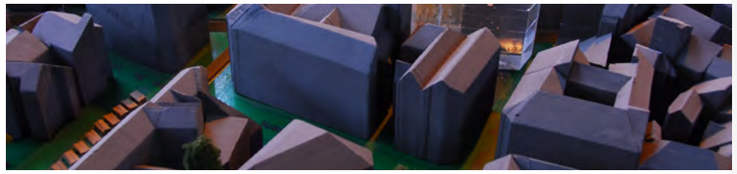
Master of Science (MSc)
Mechanical Engineering | M-ENG ADEE

ATMOSPHERIC DYNAMICS FOR ENVIRONMENT AND ENERGY

OBJECTIVES

This specialism in Mechanical Engineering aims to provide students with **advanced training on the physics, observation and modelling of atmospheric flows**. It addresses research and engineering issues in which the dynamics of the atmospheric boundary layer plays a key role: wind energy, wind propulsion, urban climate, air quality, etc.

In the field of fluid mechanics, flows in the lower atmosphere, turbulent by nature, are distinctive because they result from large-scale meteorology forcing, and dynamic and thermodynamic interactions with the Earth's surface. Numerical modeling approaches for these turbulent flows differ depending on the scale considered and the intended application. The experimental characterization of atmospheric flows, despite recent technological progress, is often complex or incomplete and its limits should be known. Therefore, the courses offered in this programme will provide an **emphasis on the physical processes involved in the dynamics of the lower atmosphere, as well as on observation and modelling methods**. Courses more specific to applications in the field of energy and urban atmosphere are also offered. The training involves theoretical courses as well as practical applications using numerical software and experimental devices.



SKILLS

Specialism-specific

> Build and use numerical models dedicated to atmospheric flows
> Design and perform experiments for characterizing the atmospheric boundary layer
> Solve engineering problems linked to atmospheric dynamics

General

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

EXAMPLES OF PREVIOUS INTERNSHIPS IN INDUSTRY/RESEARCH LABS

> Dispersion of industrial pollutants: impact of the altitude of the release point
> Reliability of methods to estimate thermal stability on complex terrain
> Study of the turbulence structure in the lower urban atmosphere using LIDAR measurements
> Preliminary studies for the implementation of an experimental campaign of flux measurements by dual-wave scintillometry in an urban environment.
> Modelling of air quality and ultrafine particles over Barcelona
> Analysis of urban heat island during heat waves by in-situ measurements

JOB PROSPECTS & FURTHER PHD STUDIES

SECTOR: Wind Energy, Wind Propulsion, Wind Engineering, Air quality, Urban environment

FIELDS: Fluid Mechanics Engineering, Environmental Fluid Mechanics, Research and Innovation

JOB POSITIONS: Wind analyst engineer, Field test engineer, Project developer in wind energy, Engineer in Consulting office or in design office, or in Research and Innovation departments (Post PhD)

PHD OPPORTUNITIES: Graduates will have the opportunity to pursue their studies after the MSc programme with a PhD in various French or international research institutes including: LHEEA (Centrale Nantes), INRAE-Bordeaux (Bordeaux University), Ecole des Ponts ParisTech, etc.

FACULTY, INDUSTRIAL PARTNERS AND RESEARCH LABS

Faculty

This Mechanical Engineering programme relies on the Centrale Nantes' faculty, staff and research facilities of the Research Laboratory in Hydrodynamics, Energetics & Atmospheric Environment (LHEEA).

Partnerships

> Engineering and consulting companies: SOLENEOS, ENERCON, POUJOULAT, METEODYN, ENGIE, NATURAL POWER
> Public establishments: CSTB, CEREMA, IRSN, EDF R&D, INERIS
> Research laboratories: LHEEA, IRSTV, CEREA

WHY CHOOSE THIS MSc?

> Wide scope of applications linked to atmospheric flows
> Recognised scientific expertise in atmospheric flow research
> Centrale Nantes is ranked 125th in the world for Mechanical Engineering in the QS World University Rankings by Subject 2024.

Learn more: *ec-nantes.fr/study/masters/atmospheric-dynamics-for-environment-and-energy*

Master of Science (MSc)
Mechanical Engineering | M-ENG AM

ADVANCED MANUFACTURING

OBJECTIVES

This MSc programme develops skills for providing innovative and optimized solutions in the advanced design and manufacturing of products and structures for both research and industry.

The courses rely on both theoretical and practical aspects and cover the following areas: **mechanical design of innovative mechanisms and products and customer-oriented design of products**. Technical, human and economic factors are taken into account.

SKILLS

Specialism-specific

> Develop innovative processes and products for composite and metallic materials and structures
> Design products adapted to the processes
> Work in an integrated numerical environment and in a design & manufacturing global chain

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, Mechanics, Consulting.

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

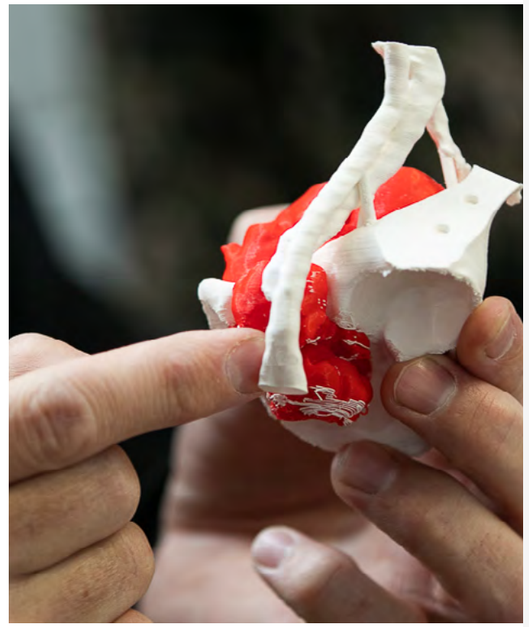
JOB POSITIONS: Mechanical Engineer, Process Engineer, Design Engineer, Research and Innovation Engineer (post PhD).

FACULTY, INDUSTRIAL PARTNERS AND RESEARCH LABS

This MSc relies on the Centrale Nantes' faculty, staff and research facilities of the GeM Research Institute and the LS2N Research Institute. Centrale Nantes has several industrial partnerships such as with Naval Group, Airbus, Chantier de l'Atlantique, General Electric, Renault, PSA.

EXAMPLES OF FINAL YEAR INTERNSHIP/ MASTER'S THESIS

> Design, optimisation and experimental validation of a high-speed mechanism, ***Ikerlan***
> Study of the thermomechanical transformations for different metal alloys, produced by LPBF and research into suitable thermal processes, ***EPFL***
> Development of a multidisciplinary design tool for Design Selection phases, ***Vallourec***
> Development and improvement of the current design of bolted connections within the offshore wind turbine, ***GE WIND France SAS***
> Process definition and development of an automated welding machine for the assembly of the floating wind turbine components, ***Technip Energies France***



WHY CHOOSE THIS MSc?

> A wide scope of manufacturing expertise: from design to manufacturing processes and control and production
> Ideal preparation for a career in either industry or research
> Centrale Nantes is ranked 125th in the world for Mechanical Engineering in the QS World University Rankings by Subject 2024

Learn more: *ec-nantes.fr/study/masters/advanced-manufacturing*

Master of Science (MSc)
Mechanical Engineering | M-ENG EP

ENERGETICS & PROPULSION

OBJECTIVES

This MSc develops skills for designing and optimizing innovative propulsion systems with a focus on thermofluid processes and energy conversion for research and industry.

The performance and efficiency of energy conversion devices such as internal combustion engines, turbojets or fuel-cells is influenced by various processes including gas flow, compression and expansion through turbomachines or reciprocating piston, fuel injection and combustion, energy conversion and heat transfer.

Therefore, the courses offered in this programme will provide an emphasis on all these processes and how they interact. A **focus is made on decarbonization with the use of carbon-free and carbon-neutral fuels**. Moreover, **integration with other power sources and energy storage** (hybridization) is also covered. Applications range from ground and marine propulsion to industrial processes, power generation and HVAC.

SKILLS

Specialism-specific

> Design energy conversion systems such as engines and their components
> Build and use simulation models of powertrains and energy systems
> Develop control strategies and calibrate control units

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: Automotive, stationary and marine engines, Aeronautics, Transportation, Power plants, Energy, HVAC for buildings.

FIELDS: Engine design & calibration, Modelling and simulation, Research and Innovation, Thermofluid Engineering, HVAC engineering.

JOB POSITIONS: Thermofluid Engineer, Design engineer, Calibration Engineer, Modelling Engineer, Research Engineer (post PhD).

COMPANIES: Stellantis, Renault, Alpine F1, Ferrari, Alstom, Safran, Airbus, Naval Group, MAN-ES, Caterpilar, Valéo, Bosch, Phinia, IFPEn, Technip, AVL, FEV, Magnetti Marelli, Sherpa, Akkodis, Expleo, Altran, Vitesco, Vaillant, Arcelor Mittal, Eiffage, Vinci, Engie.

PHD PROSPECTS: Recent graduates have pursued their studies after the MSc programme with a PhD in various French research institutes including: LHEEA in Centrale Nantes, CORIA (Rouen), PRISME (Orléans), ESTACA, FEMTO, Université Paris Saclay.

EXAMPLES OF FINAL YEAR INTERNSHIP/ MASTER'S THESIS

> Exploring oxy combustion operation in a single cylinder research engine
> Implementation and optimization of a thermal runaway characterization system for Li-ion batteries
> Dynamic coupling of multi-physics in a hot blast stove battery
> CFD flow and thermal characterization of curing ovens of hydrogen tanks
> Engine control: Development, Test and validation of a calibration

FACULTY, INDUSTRIAL PARTNERS AND RESEARCH LABS

This MSc programme relies on the Centrale Nantes' faculty, staff and research facilities of the LHEEA laboratory and in particular the Decarbonization & depollution of energy systems research group.

Companies with links to the programme: Renault, Stellantis, Mann+ Hummel, MAN Energy Solutions, Bosch, Total, Forvia, Honeywell Garett, Siemens, CMA-CGM, Bureau Veritas, Zéphir&Borée, GTT, OSE, CWS.

WHY CHOOSE THIS MSc?

> A wide scope of expertise: from fundamentals to practical applications and varied fields: energy conversion, propulsion (ground, marine, aeronautics, etc.)
> Ideal preparation for a career in either industry or research
> Centrale Nantes is ranked 125th in the world for Mechanical Engineering in the QS World University Rankings by Subject 2024

Learn more: *ec-nantes.fr/study/masters/energetics-and-propulsion*

Control and Robotics

MSc ADVANCED ROBOTICS
CORO IMARO

MSc DATA SCIENCE, SIGNAL AND IMAGE PROCESSING
CORO DASSIP

EUROPEAN MASTER ON ADVANCED ROBOTICS
EMARO

INTERNATIONAL MASTER IN ELECTRIC VEHICLE PROPULSION AND CONTROL
E-PICO+

EUROPEAN MASTER IN DYNAMICS OF RENEWABLES-BASED POWER SYSTEMS
DREAM

EUROPEAN MASTER ON CONTROL OF RENEWABLE ENERGY SYSTEMS
EU-CORE

GARGEE - CLASS OF 2023 - INDIA

Why did you decide to join the Master Programme in Signal and Image Processing?
I have always been captivated by the innovative nature of image processing and its wide-ranging applications across various fields; from its role in medical diagnostics to enhancing digital imagery. Centrale Nantes has a stellar reputation for **comprehensive curriculum, strong research activities, and exceptional faculty**. The prospect of being part of a dynamic and interdisciplinary research community was incredibly appealing to me.

What did you enjoy or find challenging about the programme?
One of the most rewarding aspects of the programme was the **remarkable quality of the faculty**. Their **willingness to go above and beyond**, providing comprehensive explanations and guidance, made a significant difference in navigating the rigorous curriculum. The lab work presented a considerable challenge, as it was an integral component of nearly every theoretical course. While it was demanding to complete numerous lab assignments corresponding to each theoretical subject, I found the **hands-on experience** essential for reinforcing my understanding. Despite the workload, I appreciated the **interactive nature of the classes**, which facilitated deeper engagement with the material.

What is your current position?
I am currently employed as an Image Processing Engineer, contributing to a collaborative project between Institut français de la vigne et du vin (IFV) and Centre de coopération internationale en recherche agronomique pour le développement (CIRAD) in Montpellier. I focus on image analysis, image registration, and deep learning techniques.

How did this Master's programme help prepare you for your current position?
The Master's programme provided me with a **solid foundation and essential skills necessary for my role** as an Image Processing Engineer. Without the training and practical experience gained through this programme, I would not have been adequately prepared to contribute effectively to the project I am currently engaged in.

Any advice for future applicants?
First and foremost, I recommend learning French, as proficiency in the language can greatly enhance your experience both academically and professionally in France. Additionally, be prepared for the intensity of the programme, but rest assured that the professors are committed to guiding you through it. Embrace the challenges and opportunities for growth.

Centrale Nantes in three words?
Dynamic - Engaging - Prestigious.

Master of Science (MSc)
Control and Robotics | CORO IMARO

ADVANCED ROBOTICS

OBJECTIVES

The main objective of this specialism in Control and Robotics 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.

The quality of this Control and Robotics programme has been recognized by the European Union: it is currently involved in the Japan-Europe Master on Advanced Robotics (JEMARO, Erasmus Mundus Joint Masters) and previously involved in the European Master on Advanced Robotics (EMARO+ Erasmus Mundus programme).

SKILLS

Specialism-specific

> Master the different fields of advanced robotics and intelligent robots
> Take a global approach to the design and implementation of robotic systems in their environment.
> Have a frame of reference of application cases in fast-growing sectors

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

EXAMPLES OF FINAL YEAR INTERNSHIP/ MASTER'S THESIS

> Off-road rover transversability
> Epileptic seizure detection based on ECG signal processing
> MPC-based control of a cable suspended load using multiple UAVs
> Stiffness analysis of a surgical robot designed for otological endoscopic surgery
> Decision making for autonomous driving in urban environments
> Intuitive task coordination with a humanoid robot
> Online trajectory planning to avoid dynamic obstacles for a 7-DoF robot arm

EMARO JOINT MSC PROGRAMME
Students enrolled in the M1 year are eligible to apply for the EMARO Joint MSc Programme and spend their M2 year either at the University of Genoa, Italy or Warsaw University of Technology, Poland.

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)

PHD OPPORTUNITIES: Recent graduates have pursued with a PhD in various French research institutes including: IRISA, Inria Sophia, Leonardo Labs, I3S, LS2N

FACULTY, INDUSTRIAL PARTNERS AND RESEARCH LABS

This Control and Robotics programme relies on Centrale Nantes faculty and the research facilities of the Laboratory of Digital Sciences of Nantes (LS2N). The students have access to LS2N research facilities - autonomous vehicles, drones (airborne / underwater), robotic arms, parallel robots, cable robots etc. - typically during their first year project work or second year thesis.

INTEGRATED MASTER-PHD TRACK
Students applying for this specialism can also apply to join in their first year the Integrated Master-PhD track, which brings together the two years of the Master's degree and three years of PhD studies. The Integrated Master-PhD track is designed to give high-potential students exposure to research activities from the M1 year.

WHY CHOOSE THIS MSc?
> State-of-the-art approaches to robotics fields, including modeling, control and perception
> Strong ties with both industrial and academic ecosystems
> The opportunity to join the EMARO joint degree programme

Learn more: *ec-nantes.fr/study/masters/advanced-robotics*

Master of Science (MSc)
Control and Robotics | CORO DASSIP

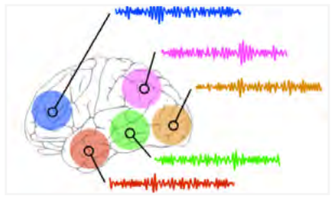
DATA SCIENCE, SIGNAL AND IMAGE PROCESSING

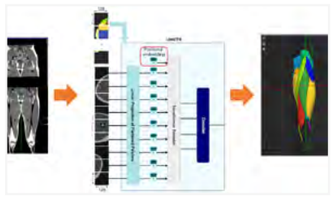
OBJECTIVES

The MSc programme in the Data Science, Signal and Image Processing focuses on understanding and developing state-of-the-art methodology for data analysis, machine learning and signal and image processing.

The acquired knowledge concerns both theoretical foundations and practical applications of data science and information retrieval, essential for the development of cutting-edge numerical methods. The courses delve into **advanced data analysis techniques, encompassing numerical mathematics, computational statistics, information theory, and scientific computing**. Practical use is explored across various domains, including biomedical engineering, computational imaging, audio processing, industrial manufacturing, or remote sensing.

A distinguishing feature of the programme lies in its **emphasis on designing methods and algorithms tailored to the specificity of the data**. Both model-based (taking into account physical models and sensing devices) and data-based (relying on statistical and deep learning) approaches are considered, ensuring that the numerical implementation aligns with the specific requirements of the application context, data volume, and available computational resources.





SKILLS

Specialism-specific

> Understand the theoretical concepts underlying modern data processing methods and master their practical implementation

> Identify how advanced data processing can achieve new results

> Acquire a solid background on real-life applications of signal, image and data processing in research and innovation

> Be aware of latest trends in AI-based techniques and become an expert in data science

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

EXAMPLES OF FINAL YEAR INTERNSHIP/ MASTER'S THESIS

> Analysis and visualization of physiological signals

> Inverse problems for lens-free imaging of nanostructured surfaces

> Survival analysis and graph representations

> Early fusion of multiple MRI sequences for enhancing pathologic case retrieval systems in radiology

> Coherence-based denoising for ultrasound small vessels imaging

> Target detection and segmentation algorithm based on deep learning and application of big data technology in satellite remote sensing

> Automatic reading recognition for pointer meters based on machine vision

> Machine vision for the quality Inspection of aircraft surfaces

JOB PROSPECTS & FURTHER PHD STUDIES

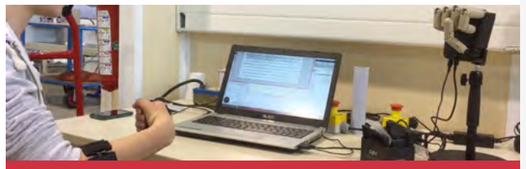
SECTOR: health, communication, instrumentation technology, computer science, research and development.

FIELDS: biomedical engineering, industrial imaging, medical imaging, telecommunication engineering, audio engineering, data science, applied mathematics.

PHD OPPORTUNITIES: graduates regularly pursue PhD studies with us at Centrale Nantes, but also recently at TU Munich, ENS Paris Saclay, INSA Lyon etc.

FACULTY, INDUSTRIAL PARTNERS AND RESEARCH LABS

The Data Science, Signal and Image Processing programme relies on Centrale Nantes' faculty and the research facilities of the Laboratory of Digital Sciences in Nantes (LS2N) and, in particular, of the SIMS (Signal, Image and Sound) research group. The research work carried out by the team members is based on methodological questions most often inspired by applied problems from a wide variety of fields, such as physics, biology, health, engineering and industrial instrumentation.



INTEGRATED MASTER-PHD TRACK
Students applying for this specialism can also apply to join in their first year the Integrated Master-PhD track, which brings together the two years of the Master's degree and three years of PhD studies. The Integrated Master-PhD track is designed to give high-potential students exposure to research activities from the M1 year.

WHY CHOOSE THIS MSc?

> Master advanced data processing techniques used across multiple sectors: health, biology, industrial manufacturing, audio, etc.

> Become an expert in AI-based techniques and data science

Learn more: *ec-nantes.fr/study/masters/data-science-signal-and-image-processing*

Erasmus Mundus Joint Master
International Master

EPiCo+ – Electric in Vehicle Propulsion and Control

Funded by the European Union

The Master's programme in Electric Vehicle Propulsion and Control (E-PiCo) welcomed its first intake of students in September 2020, under the Erasmus Mundus Joint Master label. In July 2024 the programme was renewed as E-PiCo+ for a further four cohorts from 2025-26. This two-year programme (awarding 120 ECTS) offers **multidisciplinary teaching in the e-mobility field**. The E-PiCo+ master's programme is aligned with the world's growing need for EVs (in industries, infrastructures, etc.) and **trains future EV experts capable of dealing with the energy transition**. The programme is fully taught in English and implies mobility within a minimum of two countries among 4 EU and 1 non-EU institutions.

COURSE CONTENT

The programme of study lasts two academic years (120 ECTS) with the first semester at Centrale Nantes in France and the second semester at either CINVESTAV, Mexico, UNSTPB - Romania, UAQ - Italy or CAU - Germany.

During the first semester at Centrale Nantes, the programme provides knowledge on **automatic control, signal processing, embedded systems and electric vehicles** with a focus on hybrid e-mobility-based hydrogen-battery storage system issues.

During the second semester, taught in parallel at UNSTPB, CAU, UAQ and CINVESTAV, students will have common modules related to **e-mobility**.

During the third semester, and according to the choice of host institution, the student will deal with different sectors (e.g. **battery storage systems, artificial Intelligence with applications to EVs, etc**.)

The fourth semester is set aside for the Master's Thesis. The student carries out his/her research work under the joint supervision of two advisors from two different consortium institutions.

ADMISSION CRITERIA

The E-PiCo+ programme is open to holders of a university degree with the equivalent of 180 ECTS credits in the European system, comprising at least three years of studies, at Bachelor of Science level, in a field related to electrical engineering such as:

> Control Systems
> Electrical Engineering
> Mechatronics (related to Control Systems and Electrical Engineering)

Applicants must have graduated before 31 July for non-European students and before 30 September for European students. They must speak and write English fluently. An applicant whose native language is not English is required to pass a recognized international English test.

TUITION FEES

Between €4,500-9,000 per year (see the website for more details)

See the programme website:
https://master-epico.ec-nantes.fr

ERASMUS MUNDUS SCHOLARSHIPS

Students from all over the world are eligible for an Erasmus+ Erasmus Mundus Joint Master (EMJM) scholarship. The number of scholarships awarded may vary annually. Erasmus Mundus scholarship recipients are not liable for tuition fees and receive approx. €1400 per month to cover travel, visa, installation and subsistence costs.

CONSORTIUM SCHOLARSHIPS

A number of Consortium scholarships are awarded by the consortium to students who did not obtain an Erasmus+ EMJM scholarship, but whose quality of application stood out. This scholarship will consist in a reduction of between 50% and 100% of the total tuition fees.

HOW TO APPLY

Application deadlines:
> Students applying for Erasmus+ EMJM and Consortium scholarships: 31 January 2025
> Self-funded students: 30 April 2025

Apply online: *epico.ec-nantes.fr*

CONSORTIUM

E-PiCo+ is an integrated Master's course designed and conducted by 5 partner institutions sharing a common vision of e-mobility:

> Centrale Nantes, France (coordinating institution)
> Christian-Albrechts-Universitaet zu Kiel, Germany
> Centro de Investigación y de Estudios Avanzados del Instituto Politécnico Nacional, Mexico
> Universita Degli Studi dell'Aquila, Italy
> National University of Science and Technology Politehnica Bucharest, Romania

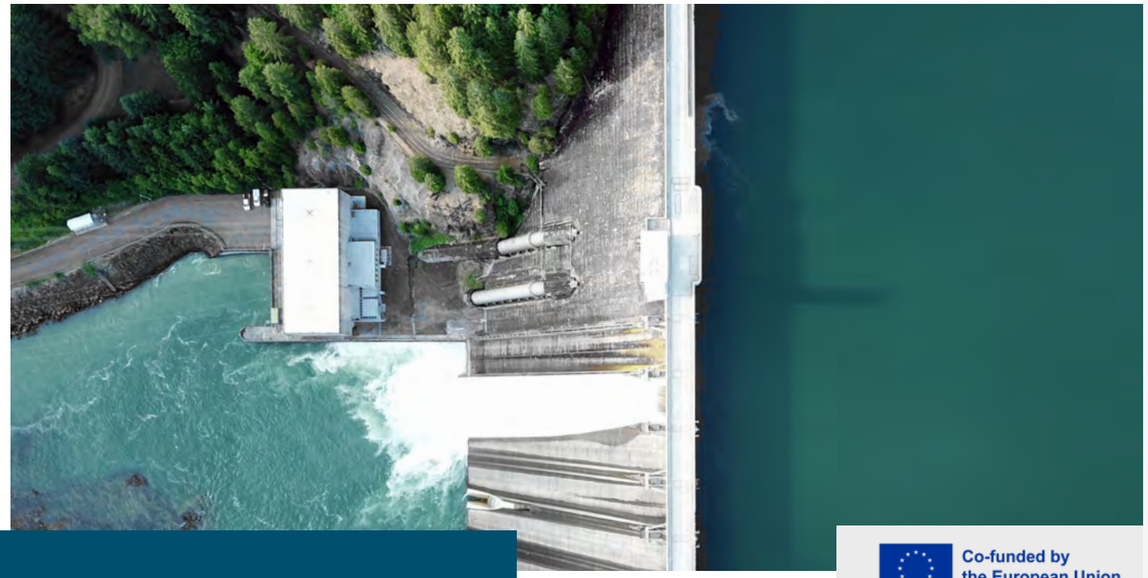
CAREER PROSPECTS

Although the E-PiCo+ programme relates primarily to the context of e-mobility, the concepts covered can be applied to a much wider range of other engineering and economic systems. The career prospects for E-PiCo+ graduates are therefore excellent. They can be employed in diverse industrial and economic sectors, as the courses are relevant to today's high tech society.

Examples of positions held by E-PiCo graduates:
Motor Control Engineer for EV powertrain systems, Power Electronics Engineer for EV powertrain design, Firmware Engineer, Programmer in a wind turbine manufacturing company, Researcher on optimal charging strategy for Electric Vehicles and Battery Storage system

Erasmus Mundus Joint Master
European Master

DREAM - Dynamics Renewables-based Power Systems



Co-funded by the European Union

The European Master in Dynamics of Renewables-based Power Systems (DREAM) is a 2-year Master's programme that offers multidisciplinary education in the modern power systems field.
DREAM trains students to **tackle the current and future challenges of smart power systems** in a new way. Core knowledge from the fields of Power Systems, Smart Grids, Renewable Generation, Automatic Control and Power Electronics is combined to give the students the opportunity to acquire a global "system view" of the dynamics of next generation power systems. DREAM aims to promote **a more integrated way of thinking in order to prepare multidisciplinary specialists trained for the new jobs and challenges of future power systems**. The language of instruction throughout the programme, which is coordinated by Centrale Nantes, is English.

COURSE CONTENT

The programme of study lasts for two academic years split into four semesters. DREAM student mobility paths will take place in minimum 2 EU countries, and possibly in 3 EU countries.

DREAM students will spend their first semester in France to acquire background in Power Systems and Automatic Control. They will move for the second semester to Germany or Spain. The third semester can be undertaken in any of the HEI partners, by choosing one specialism. **The mobility scheme will thus consist in visiting 2 or 3 EU countries in the first 3 semesters**. Semester 4 is devoted to the Master's Thesis and can take place in any of the partner or associate HEI partner or in industry. The students will then receive double or triple degrees.

ADMISSION CRITERIA

The DREAM programme is open to holders of a university degree with the equivalent of 180 ECTS credits in the European system, comprising at least three years of studies, at Bachelor of Science level, in a field related to robotics such as:

> Power Systems
> Automatic control
> Renewable energies
> Power electronics
> Applied mathematics and physics

Applicants must have graduated before 31 July for non European students and before 30 September for European students. They must speak and write English fluently. An applicant whose native language is not English is required to pass a recognized international English test.

TUITION FEES

Between €4,500-9,000 per year (see the website for more details)

See the programme website: *https://master-dream.ec-nantes.fr*

ERASMUS MUNDUS SCHOLARSHIPS

Students from all over the world are eligible for an Erasmus+ Erasmus Mundus Joint Master (EMJM) scholarship. The number of scholarships awarded may vary annually. Erasmus Mundus scholarship recipients are not liable for tuition fees and receive approx. €1400 per month for the duration of the programme to cover travel, visa, installation and subsistence costs.

CONSORTIUM SCHOLARSHIPS

A number of Consortium scholarships are awarded by the consortium to students who did not obtain an Erasmus+ EMJM scholarship, but whose quality of application stood out. This scholarship will consist in a reduction of between €2,000 and €7,000 in tuition fees.

HOW TO APPLY

Application deadlines:
> Students applying for Erasmus+ EMJM and Consortium scholarships: **31 January 2025**
> Self-funded students: **30 April 2025**

Apply online: *https://dream-candidat.ec-nantes.fr*

CONSORTIUM

The four partner institutions for the DREAM programme are:

> Centrale Nantes, France (coordinating institution)
> Universitat Politècnica de Catalunya, Spain
> Hochschule für Technik und Wirtschaft, Germany
> National University of Science and Technology Politehnica Bucharest, Romania

CAREER PROSPECTS

It is expected that by 2030, 30% of jobs in industry will be in the renewable energy field. The career prospects for DREAM graduates are therefore excellent and their education will be relevant for diverse industrial and economic sectors.

Students who complete the DREAM master's programme will have combined knowledge to tackle issues in companies acting for energy transition: transmission & distribution system operators, energy producers (renewable or classic), manufacturers (power electronics, electric drives, turbines, solar panels), electricity regulatory commissions

Students with more theoretical skills will have strong background to move into the research field, i.e., to start a PhD in these challenging fields raised by future low inertia power systems

Erasmus Mundus Joint Master
European Master

EU-CORE - European Master on Control of Renewable Energy Systems

Co-funded by the European Union

The objective of the two-year EU-CORE programme is to train top-level engineers from across the world on the **design of advanced control technologies for renewable energy systems** and to contribute to the emergence of a new generation of graduates who are needed **to achieve Europe's environmental and energy ambitions under the Green Deal**. Unlike other Erasmus+ programmes linked to renewable energy systems which focus on one source of energy, EU-CORE will cover **all the main renewable energy sources and their associated control issues**. Thanks to a selection of top-level academic and industrial partners, the skills developed throughout the EU-CORE programme will open the door to a wide variety of careers in the renewable energy industry.

COURSE CONTENT

The students will attend the same programme during the first 3 semesters, each semester addressing several specific RES and control approaches:

The **1st semester at Centrale Nantes** will focus on Wind Energy, basics on Linear/Nonlinear Control Systems and Power Systems, and general topics in RES from Economics to Law.
The **2nd semester at UNIZG** will focus on Solar Energy, Smart Grids Management, Predictive Control and Estimation/Diagnosis.
The **3rd semester at BTU** will focus on Thermal Energy, Hydrogen, Storage and Integration in Power grids.
Semester 4 is devoted to the Master's thesis and can take place in any of the partner or associate HEI partner or in industry. It will enable the students to choose a specialisation in one particular field (Wind, Solar, Thermal, Storage, etc.) in order to be duly integrated into the working world in line with their professional objectives.

Winter/Summer Schools will be organised every year. These events will boost the students' professional, entrepreneurship and soft skills, and will strengthen the RES network.

ADMISSION CRITERIA

The EU-CORE programme is open to holders of a university degree with the equivalent of 180 ECTS credits in the European system, comprising at least three years of studies, at Bachelor of Science level, in a field related to:

> **Mechanical Engineering**
> **Electrical Engineering**
> **Process Engineering**
> **Knowledge of automatic control is mandatory**

Applicants must have graduated before 31 July for non-European students and before 30 September for European students. They must speak and write English fluently. An applicant whose native language is not English is required to pass a recognized international English test.

TUITION FEES

Between €4,500-9,000 per year (see the website for more details)

See the programme website: *https://master-eu-core.ec-nantes.fr*

ERASMUS MUNDUS SCHOLARSHIPS

Students from all over the world are eligible for an Erasmus+ Erasmus Mundus Joint Master (EMJM) scholarship. The number of scholarships awarded may vary annually. Erasmus Mundus scholarship recipients are not liable for tuition fees and receive approx. €1400 per month to cover travel, visa, installation and subsistence costs.

CONSORTIUM SCHOLARSHIPS

A number of Consortium scholarships are awarded by the consortium to students who did not obtain an Erasmus+ EMJM scholarship, but whose quality of application stood out. This scholarship will consist in a reduction of up to 100% of the total tuition fees.

HOW TO APPLY

Application deadlines:
> Students applying for Erasmus+ EMJM and Consortium scholarships: **31 January 2025**
> Self-funded students: **31 May 2025**

Apply online: *https://eu-core.ec-nantes.fr*

CONSORTIUM

The three partner institutions for the EU-CORE programme are:

> Centrale Nantes, France (coordinating institution)
> Brandenberg University of Technology Cottbus-Senftenberg (BTU), Germany
> University of Zagreb (UNIZG), Croatia

CAREER PROSPECTS

The 1.5°C pathway put forward by the International Renewable Energy Agency (IRENA) in its World Energy Transitions Outlook will lead globally to 30 million jobs by 2030 and 72 million jobs by 2050. The renewable energy sector will start facing a skills shortfall from 2025 unless the number of graduates in these fields keeps pace. Students who complete the EU-CORE master's programme will have combined knowledge to tackle issues in companies acting for energy transition: Renewable energy sources, Power conversion, Energy efficiency, Smart grid management, Energy storage and integration to power grids.

Students with more theoretical skills will have a strong background to move in the research field, i.e., to start PhD in these challenging fields raised by the development of renewable energy sources.

How to apply for an MSc Programme?

Apply online: *https://ecandidat.ec-nantes.fr*

Applications are free of charge and reviewed in rounds. M1 applicants may apply in any of the three M1 rounds, and M2 applicants in either of the two M2 rounds. Applications should be submitted on the eCandidat platform as early as possible, but before the deadlines below. Only complete applications received by the round's deadline will be considered in that round.

The admissions board reviews applications at the conclusion of each round and notifies each applicant the outcome of their application.

M1 APPLICATION DEADLINE:

ROUND 1	15 Dec
ROUND 2	23 Feb
ROUND 3	28 Apr

M2 APPLICATION DEADLINE:

ROUND 1	31 Mar
ROUND 2	28 Apr

A **reduction in tuition fees** is available to non-European international students who apply early and make their first tuition payment within one month of being offered a place on the programme.

ACCEPTING YOUR PLACE
Successful applicants must accept their place on the eCandidat platform by the given deadline. To definitively secure the applicant's place on the programme the first installment of tuition fees must be paid by the given deadline.

INTEGRATED MASTER-PHD TRACK
There is **no need to apply for the track before arriving** at Centrale Nantes for your Master's programme. Your choice will be taken into account during the first year of the Master's programme so as to orient your laboratory research activities and the choice of elective modules towards the PhD thesis subject.

APPLYING FOR AN ERASMUS MUNDUS JOINT MASTER?
The application process is different for each programme. Please consult each programme page.

ADMISSION REQUIREMENTS

International applicants for M1 entry must have a bachelor's degree or equivalent, in a field related to Science and Technology. N.B. Additional specific entry requirements apply for some programmes. Students must have graduated from the above before the end of August in order to enrol in a Master's Programme at Centrale Nantes in September.

Applicants must have a good level in Mathematics and be fluent in English - written and spoken. An applicant whose native language is not English is required to submit a certificate, which is no older than three years, for a r**ecognised international test of English**. See our website for the list of recognised tests.

Students who have successfully completed a first year MSc programme can apply directly for the second year MSc programme. The same English language requirements apply.

DOCUMENTS REQUIRED

When applying for a Centrale Nantes MSc Programme you will be asked to provide the following documents in English or French:

- Your official transcripts
- A CV/Resume and motivation letter
- Your diploma
- Proof of English proficiency
- Two letters of recommendation
- Your passport or other form of official identification

Full details on our website: *https://www.ec-nantes.fr/study/masters/6-master-of-science-msc-programmes-eligibility-and-applications*

TUITION FEES & FINANCING

Tuition fees

> €12,000 per year

Elite Tuition Fee Waivers

Centrale Nantes offers a limited number of excellence-based partial tuition fee waivers to the most promising non-European students accepted into the first-year of an MSc programme.

> Gold: €8,000 per year
> Silver: €6,000 per year
> Bronze: €3,000 per year

Full details on our website: *ec-nantes.fr/study/masters/funding-opportunities-for-master-of-science-msc-programmes*

Other ways to help finance your way through your studies

Paid 6-month internship
You will be paid for your 6-month Master's thesis / internship in France. For internships undertaken in France that exceed two months in duration a minimum level of remuneration is set by the government, at **approximately €600 per month**. In some professional branches, this amount may be higher.

Work alongside your studies
You are **entitled to work part-time** alongside your studies, to earn some extra money. This option is available for both European and non-European students, but different rules apply.

Help with your rent
French and international students are eligible to receive **financial support** (known as APL in French) from the CAF (Caisses d'Allocations Familiales). The CAF is a French government organism that **covers part of the monthly cost of rent paid for student accommodation** – the allocated amount depends on the type of accommodation and on your income.

Learn more

admission@ec-nantes.fr
ec-nantes.fr

Meet with us

Centrale Nantes, with the support of Campus France and other partners, attends education exhibitions and fairs all over the world.

At every event we meet with students and provide free education advice and information about studying at Centrale Nantes and employability. Our aim is to help prospective students to match their expectations.

Join us for a webinar

You can also find out more about Centrale Nantes courses by joining us online for our series of webinars.

Consult our website for upcoming dates:
https://www.ec-nantes.fr/international/study-at-centrale-nantes/meet-us