SHAKE THE FUTURE.

CENTRALE NANTES

Master
Civil Engineering

MATERIALS & STRUCTURES IN THEIR ENVIRONMENT

OBJECTIVES

This programme aims to develop scientific and technological knowledge on materials and structures in both the academic and R&D sectors. It is characterized by a high degree of scientific specialisation.

The master programme focuses on the following specialised areas: numerical modelling, constitutive laws, structural reliability, advanced experimental techniques, durability, modern concrete, geomechanics and earthquake engineering.
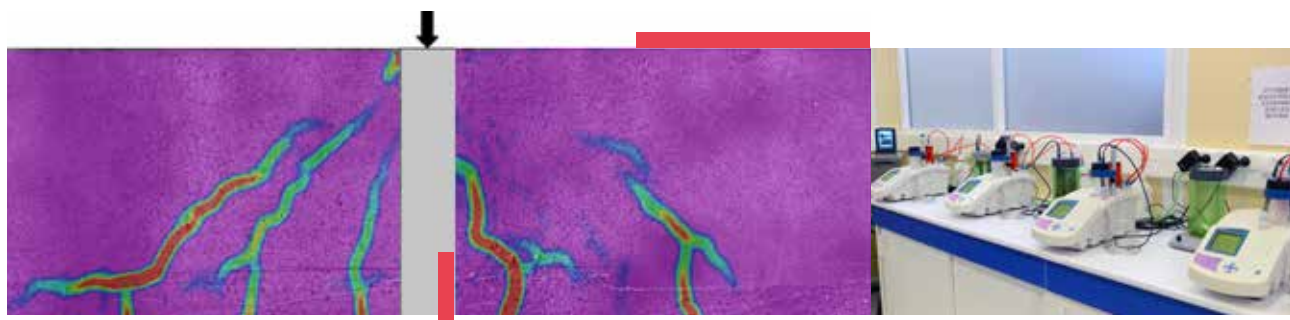
SKILLS

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 from international research and professional literature

> Manage or participate to a project

JOB PROSPECTS & FURTHER PHD STUDIES

SECTOR: Civil Engineering.

FIELDS: Research and development.

JOB POSITIONS: Research and Innovation Engineer (post PhD).

Location
Nantes, France - 2 hours from Paris

International campus life

87
nationalities

43%
international students

EXAMPLES OF FINAL YEAR PROJECTS

5 to 6 month internship in Industry
> Study of the deformation and temperature of cementitious materials by 3D instrumentation

5 to 6 month thesis in Research Labs
> Poro-mechanical modelling of soil and rock erosion
> Dynamic effect of capillary pressure on drying / wetting of cementitious materials
> Analysis and modelling of stochastic degradation fields on the Île de Ré bridge: impact of uncertainties on the diagnosis
> Soil Structure Interactions in earthquake engineering

FACULTY, INDUSTRIAL PARTNERS AND RESEARCH LABS

Laboratories
Courses are mainly given by researchers of the Institut de recherche en Génie civil et Mécanique (GeM, Centrale Nantes, University of Nantes, CNRS) and the Institut Français des Sciences et Technologies des Transports, de l'Aménagement et des Réseaux (IFSTTAR, Nantes). The supporting research institutes have extensive experimental test facilities for static and dynamic characterisation of materials and structures and a high tech computational centre.

International collaboration
Université Libre de Bruxelles (Belgium), Université de Liège (Belgium), Tongji University (China), Cyprus University of Technology (Cyprus), Università degli Studi di Perugia (Italy), Alliance of Laboratories in Europe for Research and Technology (ALERT).

OTHER PROGRAMME INFORMATION
> Length of Studies: 2 years
> Language of instruction: English
> 3 semesters of courses and 1 semester of Master's thesis

Tuition & Fees - Scholarships - Application process - Deadlines

MORE INFORMATION AND FULL PROGRAMME:
www.ec-nantes.fr/masters
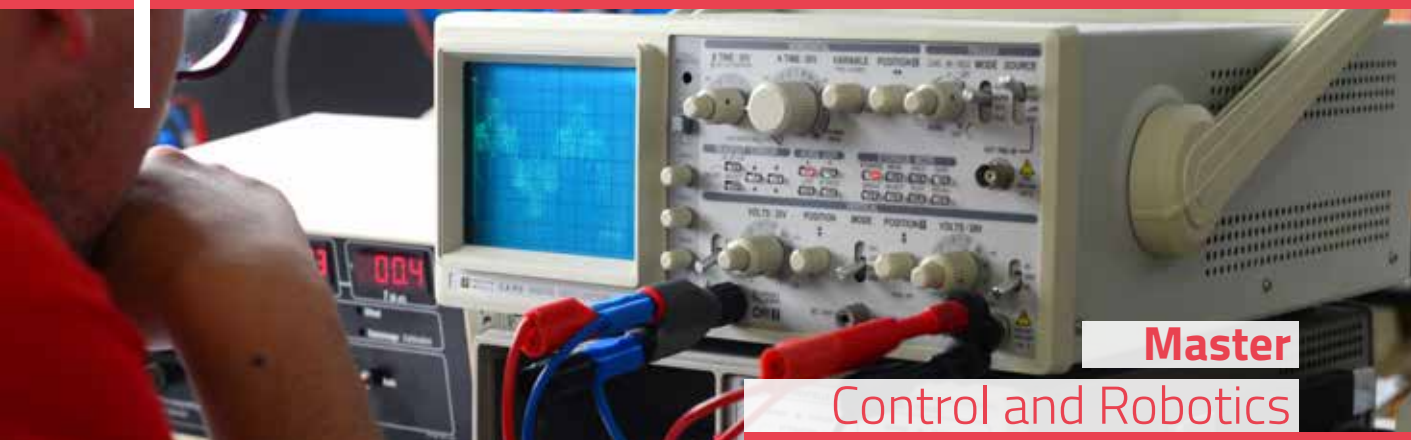
CONTACT: master.admission@ec-nantes.fr

CONTENT AND COURSES
(A Master Degree requires the validation of 120 ECTS credits)

M1 - AUTUMN SEMESTER	ECTS
Continuum Mechanics	5
Fluid Mechanics 1	5
Algorithmics for Engineering Modelling	4
Numerical Methods	4
Vibration	4
Business Environment	4
Modern Languages	4
M1 - SPRING SEMESTER	**ECTS**
Physical modeling	4
Constitutive Laws	5
Imaging in civil engineering	5
Geotechnical Engineering	5
Concrete and structures	5
Mathematical Methods in Civil Engineering	2
Modern Languages	4
M2 - AUTUMN SEMESTER	**ECTS**
Numerical Analysis	4
Mechanics of Porous Media	4
Statistics of materials and structural reliability	4
Project	2
Modern Languages	4
TRACK 1 COURSES	
Homogenization Methods in Heterogenous Media	4
Design and Behaviour of Modern Concrete	4
Durability and structural maintenance	4
TRACK 2 COURSES	
Theory of Structures	4
Earthquake Engineering	4
Large Infrastructures of Energy and Transport	4
M2 - SPRING SEMESTER	**ECTS**
Master Thesis or Industrial Internship	30

NB Course content may be subject to minor changes

RESEARCH INTENSIVE INSTITUTE OF TECHNOLOGY | FRENCH **GRANDE ÉCOLE** | FOUNDED IN 1919

This Master's programme is accredited by French Ministry of Higher Education.

BIENVENUE EN FRANCE

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MINISTÈRE
DE L'ÉDUCATION NATIONALE,
DE L'ENSEIGNEMENT SUPÉRIEUR
ET DE LA RECHERCHE

Master
Control and Robotics

CONTROL SYSTEMS

OBJECTIVES

The objective is to provide theoretical and methodological tools in order to analyse the structure and properties of dynamic systems, and to design control and observation solutions.

This program introduces recent results in modern control theory of linear and nonlinear systems, including structural analysis, modelling, control and observation structures design (robust, optimal, ...), and application of optimization methods in control system design. An important topic of the track is the use of real applications among different fields (energy, grids, transportation, ...) in order to illustrate the different concepts of modelling, control and observation.
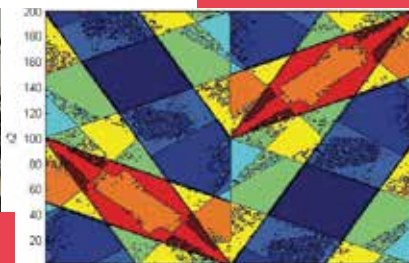
SKILLS

Specialism-specific

> Learn and understand the frame of modern theory for analysis and modelling of dynamic systems

> Learn how to apply adapted methods of control, estimation and diagnostic (linear, nonlinear, robust, optimal, ...) to dynamic systems

> Be able to apply these methods to real systems

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, Energy, Consulting, banking, petroleum, ...

FIELDS: Control Engineering, Advanced Processes, Manufacturing, Research and Innovation,

JOB POSITIONS: Control Engineer, Process Engineer, Design Engineer, Research and Innovation Engineer (completed with a PhD).
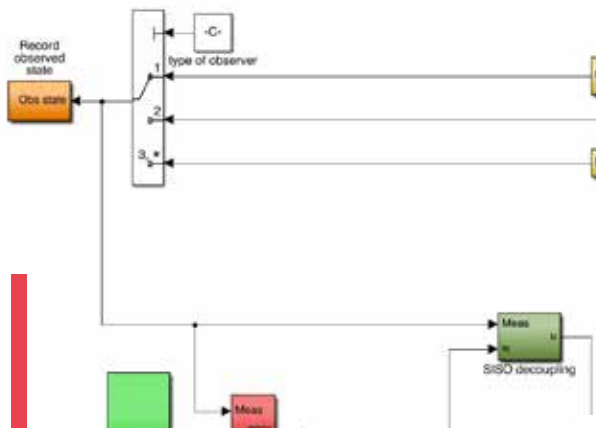
Location
Nantes, France -2 hours from Paris

International campus life

87
nationalities

43%
international students

EXAMPLES OF FINAL YEAR PROJECTS

5 to 6 month internship in Industry

> Modelling and control design of floating wind turbines

> Estimation algorithms of thermal parameters in a house

> Modelling of distributed renewable energy in a transmission power grid

5 to 6 month thesis in Research Labs

> Impact investigation and control of increasing electric vehicle loads on distribution power grids

> Robust nonlinear control of a 3DOF helicopter

> Optimal Control of Power Electronic Elements Inserted into Modern Power Transmission Grids

FACULTY, INDUSTRIAL PARTNERS AND RESEARCH LABS

This Master relies on the Centrale Nantes' faculty, staff and research facilities of the LS2N Institute. Centrale Nantes has several industrial partnerships: in particular mose involved in Control activities as Renault, RTE (Leading French company managing the national power grid).

OTHER PROGRAMME INFORMATION

> Length of Studies: 2 years

> Language of instruction: English

> 3 semesters of courses and 1 semester of Master's thesis

Tuition & Fees - Scholarships - Application process - Deadlines

MORE INFORMATION AND FULL PROGRAMME:
www.ec-nantes.fr/masters
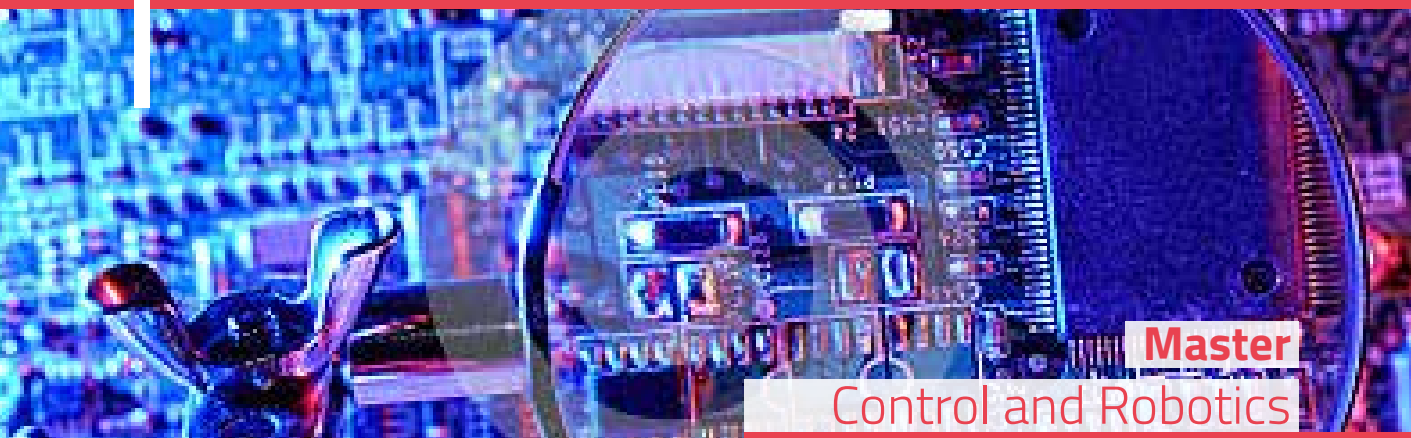
CONTACT: master.admission@ec-nantes.fr

CONTENT AND COURSES
(A Master Degree requires the validation of 120 ECTS credits)

M1 - AUTUMN SEMESTER	ECTS
Signal Processing	5
Classical Linear Control	5
Artificial Intelligence	4
Modelling of Manipulators	4
Systems Identification and Signal Filtering	4
Embedded Computing	4
Modern Languages	4
M1 - SPRING SEMESTER	**ECTS**
Group Project	6
Optimization Techniques	4
Mobile Robots	4
Programming Real Time Systems	4
Dynamic Model Based Control	4
Non Linear Control Theory	4
Modern Languages	4
M2 - AUTUMN SEMESTER	**ECTS**
Mathematical modelling	4
Optimization	4
Robust and optimal control	4
Observation and diagnostic	4
Complex systems	4
Analysis and Control Methodologies: Standard, Generalized and Time-Varying Systems	4
Project	2
Modern Languages	4
Conferences	-
M2 - SPRING SEMESTER	**ECTS**
Master Thesis or Industrial Internship	30

NB Course content may be subject to minor changes

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SHAKE THE FUTURE.

CENTRALE NANTES

Master
Control and Robotics

EMBEDDED REAL TIME SYSTEMS

OBJECTIVES

Acquire theoretical and methodological knowledge for the modelling and the analysis of embedded and real time systems and for the design of reliable solutions.

This programme introduces the techniques currently used for the design and the verification of embedded systems, and more especially real-time embedded systems. The track relies on several courses covering various topics: the design of real-time systems and the architecture of a real-time operating system (OSEK/VDX standard is used); the real-time scheduling policies and the associated implementation; tools for the modelling and verification of real-time systems: Petri net, finite state automata and timed automata.

SKILLS

Specialism-specific

> Model and analyse embedded systems subjected to energy and real time critical constraints

> Master the whole design and development cycle of embedded systems (from their specification to their implementation and certification)

> Acquire the knowledge of the specific characteristics of new generations of embedded systems (OS Autosar, multi-core targets, etc.)

General

> Identify models, perform simulation and analyse results

> Communicate comprehensive results in a meaningful way

> Undertake bibliographic surveys from international research and professional literature

> Manage or be part of a project

JOB PROSPECTS & FURTHER PHD STUDIES

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

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

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

Location
Nantes, France - 2 hours from Paris

International campus life

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EXAMPLES OF FINAL YEAR PROJECTS

5 to 6 month internship in Industry
> Design of Embedded Systems for Drones
> Internet of Things (IoT): connecting Embedded System
> Modelling and validation of an aerial video tracking system

5 to 6 month thesis in Research Labs
> Multicore Real Time operating systems
> Formal verification of parametric systems
> Task Scheduling in Energy Harvesting Real-time Embedded Systems

FACULTY, INDUSTRIAL PARTNERS AND RESEARCH LABS

This Master relies on the Centrale Nantes' faculty, staff and research facilities of the LS2N Institute. Centrale Nantes has several industrial partnerships such as Airbus, Thales, Smiles, Renault (...) involved in this master through projects, contracts and internships. Moreover, we have many collaborations with research departments abroadsuch as with Ecole Polytechnique de Montréal, Aalborg University, TU Munich...

OTHER PROGRAMME INFORMATION
> Length of Studies: 2 years
> Language of instruction: English
> 3 semesters of courses and 1 semester of Master's thesis

Tuition & Fees - Scholarships - Application process - Deadlines

MORE INFORMATION AND FULL PROGRAMME:
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CONTENT AND COURSES
(A Master Degree requires the validation of 120 ECTS credits)

M1 - AUTUMN SEMESTER	ECTS
Signal Processing	5
Classical Linear Control	5
Artificial Intelligence	4
Embedded Electronics	4
Advanced and Robot Programming	4
Embedded Computing	4
Modern Languages	4
M1 - SPRING SEMESTER	**ECTS**
Group Project	6
Optimization Techniques	4
Mobile Robots	4
Programming Real Time Systems	4
Software Architecture for Robotics	4
Computer Vision	4
Modern Languages	4
M2 - AUTUMN SEMESTER	**ECTS**
Embedded Software Systems	4
Energy-aware Embedded Systems	4
Automated Planning	4
Real Time Scheduling	4
Formal Modelling and verification	4
Petri Nets	4
Project	2
Modern Languages	4
Conferences	-
M2 - SPRING SEMESTER	**ECTS**
Master Thesis or Industrial Internship	30

NB Course content may be subject to minor changes

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DE L'ENSEIGNEMENT SUPÉRIEUR
ET DE LA RECHERCHE

Graduate programme | **Master** in Sciences, Technologies and Health

Master
Control and Robotics

ADVANCED ROBOTICS

OBJECTIVES

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

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

SKILLS

Specialism-specific

> Master the variousfields of advanced robotics and smart robots (kinematic and dynamic modelling, dynamic command, computation, perception organs and mechanical design)

> Merge design and implantation of robotic systems in their environment

> Possess a body of knowledge of case studies in growing sectors (production robotics, autonomous vehicles, humanoid robotics...)

General

> Identify models, perform simulation and analyse results

> Communicate comprehensive results in a meaningful way

> Undertake bibliographic surveys from international research and professional literature
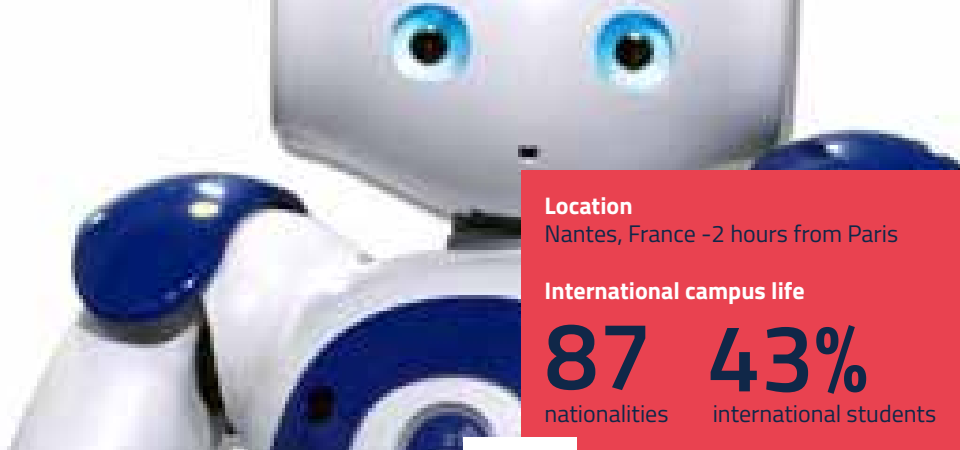
> Manage or be part of a project

JOB PROSPECTS & FURTHER PHD STUDIES

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

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

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

Location
Nantes, France -2 hours from Paris

International campus life

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nationalities

43%
international students

CONTENT AND COURSES
(A Master Degree requires the validation of 120 ECTS credits)

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

*Elective courses - choose 3 out of 5
NB Course content may be subject to minor changes

EXAMPLES OF FINAL YEAR PROJECTS

5 to 6 month internship in Industry
> Control and Navigation Strategies in Uncertain Environments with Human Operators (AGI)
> Obstacle and self-collision avoidance with a dual-arm Manipulator (AGI)

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

FACULTY, INDUSTRIAL PARTNERS AND RESEARCH LABS

This Master relies on the Centrale Nantes' faculty, staff and research facilities of the LS2N Institute. Centrale Nantes has several industrial partnerships such as with BA System, Airbus Group Innovation, Gaussin, Renault, Akka Technologies, GE, Tecnalia, IRT Jules Vernes, ...

OTHER PROGRAMME INFORMATION

> Length of Studies: 2 years
> Language of instruction: English
> 3 semesters of courses and 1 semester of Master's thesis

Tuition & Fees - Scholarships - Application process - Deadlines
MORE INFORMATION AND FULL PROGRAMME:
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**CONTACT: master.admission@ec-nantes.fr**

Master
Control and Robotics

SIGNAL AND IMAGE PROCESSING

OBJECTIVES

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

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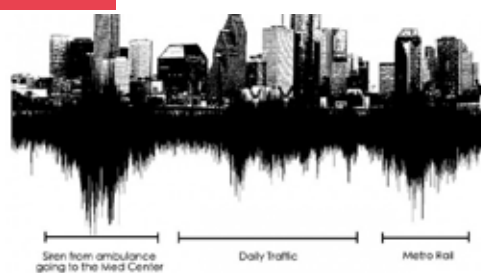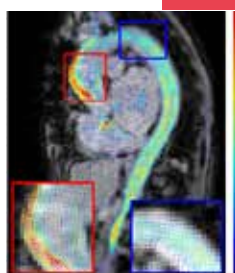
SKILLS

Specialism-specific

> Establish a relevant statistical model for data representation and analysis

> Propose a methodological solution and its numerical implementation suited to the application context

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

General

> Identify models, perform simulations and analyze results

> Undertake a literature survey of existing works on a scientific problem

> Communicate comprehensive results in a meaningful way

> Manage and supervise research and innovation projects

JOB PROSPECTS & FURTHER PHD STUDIES

SECTOR: Health, Communication technologies, Transportation.

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

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

Graduate programme | **Master** in Sciences, Technologies and Health

Location
Nantes, France - 2 hours from Paris

International campus life

87
nationalities

43%
international students

EXAMPLES OF MASTER THESES

5 to 6 month internship in Medicine

> Analysis of Electromyographic signals for neuromuscular disease characterization

> Reconstruction of Positron Emission Tomography images in the context of low statistics

> Resolution enhancement in Magnetic Resonance Imaging for cardiovascular diagnosis

5 to 6 month internship in Industry

> Optimization of a tyre pressure monitoring system in an automotive vehicle

> Fast imaging algorithm for structured illumination microscopy

5 to 6 month thesis in Research Labs

> Numerical optimization for sparse ultrasound signal recovery and ultrasonic imaging

> Analysis and classification of environmental sounds using deep learning methods

FACULTY, INDUSTRIAL PARTNERS AND RESEARCH LABS

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

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

OTHER PROGRAMME INFORMATION

> Length of Studies: 2 years

> Language of instruction: English

> 3 semesters of courses and 1 semester of Master's thesis

Tuition & Fees - Scholarships - Application process - Deadlines

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CONTENT AND COURSES
(A Master Degree requires the validation of 120 ECTS credits)

M1 - AUTUMN SEMESTER	ECTS
Signal Processing	5
Classical Linear Control	5
Artificial Intelligence	4
Embedded Electronics	4
Systems Identification and Signal Filtering	4
Embedded Computing	4
Modern Languages	4
M1 - SPRING SEMESTER	**ECTS**
Group Project	6
Optimization Techniques	4
Mobile Robots	4
Programming Real Time Systems	4
Spectral and Time Frequency Analysis	4
Computer Vision	4
Modern Languages	4
M2 - AUTUMN SEMESTER	**ECTS**
Statistical Signal Processing and Estimation Theory	4
Design of Signal and Image Representations	4
Machine Learning, Data Analyis and Information Retrieval	4
Signal and Image Restoration, Inversion Methods	4
Mathematical tools for signal and image processing	4
Biomedical signals, images and methods	4
Project	2
Modern Languages	4
M2 - SPRING SEMESTER	**ECTS**
Master Thesis or Industrial Internship	30

NB Course content may be subject to minor changes

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ET DE LA RECHERCHE

What is the place of humans inside new factory?

Process

Pro-duct

ERP PLM

MES

Master
Industrial Engineering

Graduate programme | **Master** in Sciences, Technologies and Health

AGILE FACTORY MANAGEMENT

OBJECTIVES

This Master develops skills for agile factory management based on operational research methods and production management approaches, such as lean, adaptive and reactive management.

The courses rely on both theoretical and practical aspects and cover the following areas: enterprise and complex system design, modelling and engineering; production management; simulation and multi-criteria optimization of industrial processes; economy and social aspects for industrial engineering; logistics; operational research; shop floor scheduling; design and control of production cyber-physical systems.

SKILLS

Specialism-specific

> To master modeling and simulation of production systems

> To master optimisation methods for production systems control

> To master the new concepts and performance indicators of the smart and agile factory

General

> To identify models, perform simulation and analyse results

> Communicate comprehensive results in a meaningful way

> Undertake bibliographic surveys from international research and professional literature

> To manage or be part of a project

JOB PROSPECTS & FURTHER PHD STUDIES

SECTOR: Aeronautics, Automotive, Transports, Naval, Energy, Mechanics, Services, Consulting.

FIELDS: Industrial engineering, Mechanical engineering, Production management, Research and Innovation.

JOB POSITIONS: Industrial manager, Mechanical Engineer, Process Engineer, Production manager, Research and Innovation Engineer (post PhD).

Location

Nantes, France -2 hours from Paris

International campus life

87
nationalities

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international students

EXAMPLES OF FINAL YEAR PROJECTS

5 to 6 month internship in Industry

> Developing a framework to coordinate innovation projects, Assystem, Paris, France
> Lean Manufacturing Manager, Louis Vuitton, Barberà del Vallès, Spain
> ERP configuration with SAP, Mansa Sugar, Luapula, Zambia
> Project Manager, DXC Technology, Paris, France

5 to 6 month thesis in Research Labs

> Reducing mental-load on assembly lines: augmented reality contribution, LS2N, Nantes, France
> Interoperability between MES and ERP, LS2N, Nantes, France

FACULTY, INDUSTRIAL PARTNERS AND RESEARCH LABS

This Master relies on the Centrale Nantes' faculty, staff and research facilities of the LS2N Research Institute and other faculty members from University of Nantes as well as modules delivered experts from companies. Centrale Nantes has several industrial partnerships (Airbus, DCNS, Michelin, Alstom, Dassault Systems, Renault, Faurecia, etc.), service bureaux and start-up companies.

OTHER PROGRAMME INFORMATION

> Length of Studies: 2 years
> Language of instruction: English
> 3 semesters of courses and 1 semester of Master's thesis

Tuition & Fees - Scholarships - Application process - Deadlines

MORE INFORMATION AND FULL PROGRAMME:
www.ec-nantes.fr/masters

CONTACT: master.admission@ec-nantes.fr

CONTENT AND COURSES
(A Master Degree requires the validation of 120 ECTS credits)

M1 - AUTUMN SEMESTER	ECTS
Introduction to Ind 4.0 processes	4
Enterprise modelling	4
Introduction to Optimization Methods	4
Production management (1)	4
Discrete-event Simulation	4
Financial and Economic Aspects for Industrial Engineering	4
Basics of Computer Science and Mathematics	2
Modern Languages*	4
M1 - SPRING SEMESTER	**ECTS**
Systems engineering	4
Statistics and data analytics	4
Management and Socio-Organizational Aspects for Industrial Engineering	4
Enterprise management	4
Advanced Simulation	4
Innovation Engineering	4
Introduction to Research	2
Modern Languages	4
M2 - AUTUMN SEMESTER	**ECTS**
Production management (2)	4
Logistics	4
Operations research	4
Shop floor scheduling	4
Multi-criteria decision making and decision support	4
Integrated design and implementation of cyber-physical production systems (CPPS)	4
Project & Conferences	2
Modern languages	4
M2 - SPRING SEMESTER	**ECTS**
Master Thesis or Industrial Internship	30

NB Course content may be subject to minor changes

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ET DE LA RECHERCHE

Master
Industrial Engineering

SMART AND CONNECTED ENTERPRISE

OBJECTIVES

This Master develops skills for enterprise management based on process performance assessment and information systems design and management for smart and connected enterprises.

The courses rely on both theoretical and practical aspects and cover the following areas: enterprise and complex system design, modelling and engineering; production management; information system design, development and management; interoperability of information systems; simulation and multi-criteria optimization of industrial processes; economic and social aspects for industrial engineering.

SKILLS

Specialism-specific

> To master enterprise modeling methods

> To master simulation and optimization methods for enterprise performance assessment

> To master interoperability of information systems of smart and connected enterprises

General

> To identify models, perform simulation and analyse results

> Communicate comprehensive results in a meaningful way

> Undertake bibliographic surveys from international research and professional literature

> To manage or be part of a project

JOB PROSPECTS & FURTHER PHD STUDIES

SECTOR: Aeronautics, Automotive, Transports, Naval, Energy, Mechanics, Services, Consulting

FIELDS: Industrial engineering, Design engineering, Mechanical engineering, Production management, Information systems design and management, Research and Innovation

JOB POSITIONS: Industrial manager, Mechanical Engineer, Process Engineer, Production manager, Design Engineer, Research and Innovation Engineer (post PhD)

Graduate programme | **Master** in Sciences, Technologies and Health

Location
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international students

CONTENT AND COURSES
(A Master Degree requires the validation of 120 ECTS credits)

M1 - AUTUMN SEMESTER	ECTS
Introduction to Ind 4.0 processes	4
Enterprise modelling	4
Introduction to Optimization Methods	4
Production management	4
Discrete-event Simulation	4
Financial and Economic Aspects for Industrial Engineering	4
Basics of Computer Science and Mathematics	2
Modern Languages*	4
M1 - SPRING SEMESTER	**ECTS**
Systems engineering	4
Statistics and data analytics	4
Management and Socio-Organizational Aspects for Industrial Engineering	4
Enterprise Management	4
Advanced Simulation	4
Innovation Engineering	4
Introduction to Research	2
Modern Languages	4
M2 - AUTUMN SEMESTER	**ECTS**
Artificial Intelligence for decision-making in industrial engineering	4
Data and knowledge integration in the enterprise	4
Collaborative information systems in enterprise	4
Integrated design engineering of product-service systems	4
Multi-criteria decision making and decision support	4
Integrated design and implementation of cyber-physical production systems	4
Conferences	2
Modern languages	4
M2 - SPRING SEMESTER	**ECTS**
Master Thesis or Industrial Internship	30

NB Course content may be subject to minor changes

EXAMPLES OF FINAL YEAR PROJECTS

5 to 6 month internship in Industry
> Open Innovation Intern, BMW Group, Beihing, China
> Support System for Industry Excellence, Airbus Helicopters, Marignane, France
> Model-Based System Engineering for Industrial Systems, ALTRAN Technologies, Blagnac, France

5 to 6 month thesis in Research Labs
> Development of product ontology for additive manufacturing, LS2N, Nantes, France
> A model-based system engineering approach for the design of flexible production systems, LS2N, Nantes, France

FACULTY, INDUSTRIAL PARTNERS AND RESEARCH LABS

This Master relies on the Centrale Nantes' faculty, staff and research facilities of the LS2N Research Institute and other faculty members from University of Nantes as well as modules deliverd experts from companies. Centrale Nantes has several industrial partnerships (Airbus, DCNS, Michelin, Alstom, Dassault Systems, Renault, Faurecia, etc.), service bureaux and start-up companies.

OTHER PROGRAMME INFORMATION

> Length of Studies: 2 years
> Language of instruction: English
> 3 semesters of courses and 1 semester of Master's thesis

Tuition & Fees - Scholarships - Application process - Deadlines

MORE INFORMATION AND FULL PROGRAMME:
www.ec-nantes.fr/masters

CONTACT: master.admission@ec-nantes.fr

RESEARCH INTENSIVE INSTITUTE OF TECHNOLOGY | FRENCH **GRANDE ÉCOLE** | FOUNDED IN 1919
This Master's programme is accredited by French Ministry of Higher Education.

BIENVENUE EN FRANCE

Liberté • Égalité • Fraternité
RÉPUB IQUE FRANÇAISE
MINISTÈRE
DE L'ÉDUCATION NATIONALE,
DE L'ENSEIGNEMENT SUPÉRIEUR
ET DE LA RECHERCHE

Graduate programme | **Master** in Sciences, Technologies and Health

Master
Mechanical Engineering

ADVANCED COMPOSITE ENGINEERING AND SCIENCE

OBJECTIVES

This Master programme 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 the manufacturing's influences and constraints. Therefores the curriculum offered in this programme will provide a theoretical and experimental emphasis on the relationships between constituents, processing and structural design.
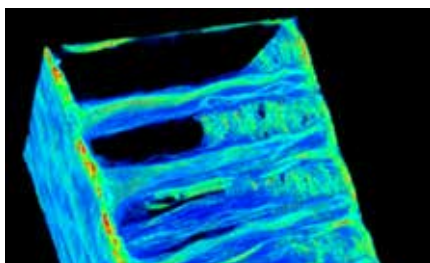
SKILLS

Specialism-specific

> Simulate and optimize composite mechanical design and manufacturing using numerical tools

> Model materials' behaviour 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 from international research and professional literature

> Manage or be part of a project

JOB PROSPECTS & FURTHER PHD STUDIES

SECTOR: Aeronautics, Automotive, Transportation, Wind and Marine Energy, Materials producer, 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.
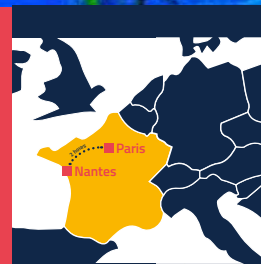
Location
Nantes, France -2 hours from Paris

International campus life

87 nationalities

43% international students

EXAMPLES OF FINAL YEAR PROJECTS

5 to 6 month internship 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

5 to 6 month thesis 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 films piezoelectric materials

FACULTY, INDUSTRIAL PARTNERS AND RESEARCH LABS

This Master relies on the Centrale Nantes' faculty, staff and research facilities of the GeM Institute, the LHEEA Laboratory and the LS2N Institute. Centrale Nantes has several industrial partnerships such as with Airbus, Renault, Faurecia, Solvay, IFREMER, CETIM.
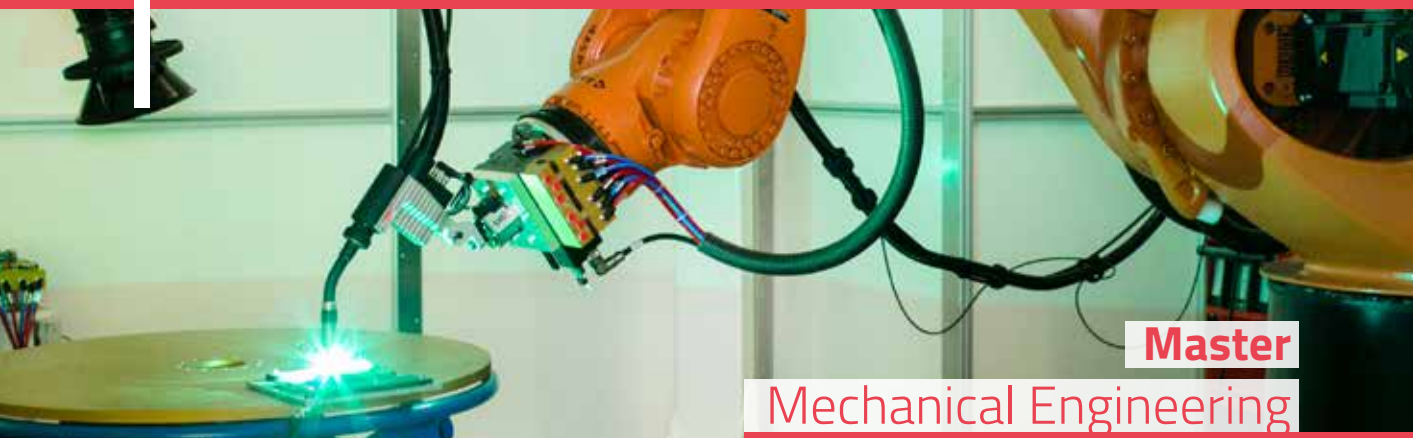
OTHER PROGRAMME INFORMATION

> Length of Studies: 2 years

> Language of instruction: English

> 3 semesters of courses and 1 semester of Master's thesis

Tuition & Fees - Scholarships - Application process - Deadlines

MORE INFORMATION AND FULL PROGRAMME:
www.ec-nantes.fr/masters

CONTACT: master.admission@ec-nantes.fr

CONTENT AND COURSES
(A Master Degree requires the validation of 120 ECTS credits)

M1 - AUTUMN SEMESTER	ECTS
Continuum Mechanics	5
Fluid Mechanics	5
Algorithmics for Engineering Modelling	4
Numerical Methods	4
Vibrations	4
Business Environment	4
Modern Languages	4
Conferences	-
M1 - SPRING SEMESTER	**ECTS**
Engineering Materials	5
Constitutive Laws	5
Structural Mechanics	5
Computer-aided Design	5
Mechanical Design	4
Conferences and Initiation to Research	2
Modern Languages	4
M2 - AUTUMN SEMESTER	**ECTS**
Composite Constituents and Processes	4
Composites Characterization	4
Composites Processing Modelling (1)	3
Composite Structures	4
Composites Processing Modelling (2)	3
Multi-Physics Modelling for Processes	4
Modern Languages	4
Project	4
Conferences	-
M2 - SPRING SEMESTER	**ECTS**
Master Thesis or Industrial Internship	30

NB Course content may be subject to minor changes

RESEARCH INTENSIVE INSTITUTE OF TECHNOLOGY | FRENCH **GRANDE ÉCOLE** | FOUNDED IN 1919

This Master's programme is accredited by French Ministry of Higher Education.

Master

Mechanical Engineering

ADVANCED MANUFACTURING

OBJECTIVES

This Master 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.
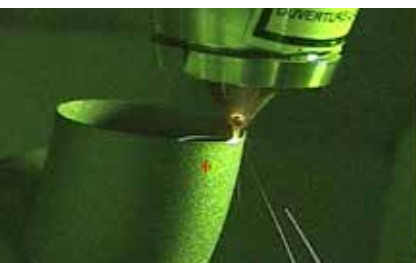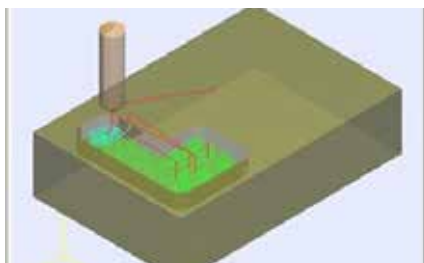
SKILLS

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).

Location
Nantes, France -2 hours from Paris

International campus life

87
nationalities

43%
international students

EXAMPLES OF FINALYEAR PROJECTS

5 to 6 month internship in Industry

> Mechatronic design for automotive front seats
> Design optimization for noise reduction of rear axle's bushings
> Modelling and simulation of an electro-hydraulic actuator

5 to 6 month thesis in Research Labs

> Magnetic pulse spot welding between aluminum and steel sheets
> CAD design and prototyping of a reconfigurable 3-PRS parallel mechanism
> Wire additive manufacturing: development of a depositing head

FACULTY, INDUSTRIAL PARTNERS AND RESEARCH LABS

This Master 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 DCNS, STX, Renault, Faurecia, CETIM, CATIA, UGS.

OTHER PROGRAMME INFORMATION

> Length of Studies: 2 years
> Language of instruction: English
> 3 semesters of courses and 1 semester of Master's thesis

Tuition & Fees - Scholarships - Application process - Deadlines

MORE INFORMATION AND FULL PROGRAMME:
www.ec-nantes.fr/masters
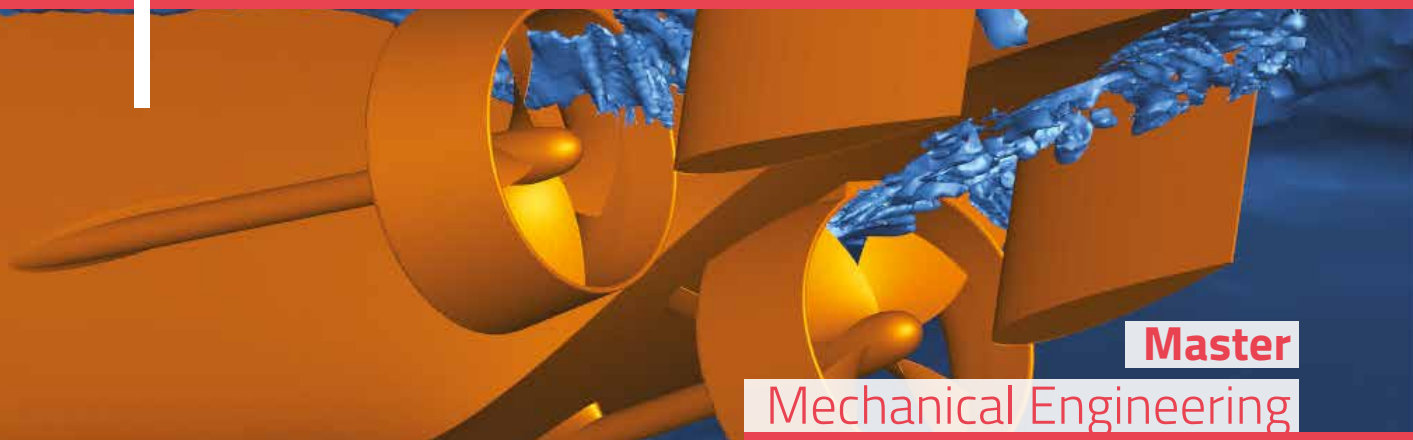
CONTACT: master.admission@ec-nantes.fr

CONTENT AND COURSES
(A Master Degree requires the validation of 120 ECTS credits)

M1 - AUTUMN SEMESTER	ECTS
Continuum Mechanics	5
Fluid Mechanics	5
Algorithmics for Engineering Modelling	4
Numerical Methods	4
Vibrations	4
Business Environment	4
Modern Languages	4
M1 - SPRING SEMESTER	**ECTS**
Engineering Materials	5
Constitutive Laws	5
Structural Mechanics	5
Computer-aided Design	5
Mechanical Design	4
Conferences and Initiation to Research	2
Modern Languages	4
M2 - AUTUMN SEMESTER	**ECTS**
Advanced CAD/CAM/CNC	4
Additive Manufacturing and advanced manufacturing processes	4
Design of Experiments methods for manufacturing	4
Optimization in manufacturing engineering	4
Integrated Design Engineering of PSS	4
Multi-physics modelling for processes	4
Modern Languages	4
Project	2
Conferences	-
M2 - SPRING SEMESTER	**ECTS**
Master Thesis or Industrial Internship	30

NB Course content may be subject to minor changes

RESEARCH INTENSIVE INSTITUTE OF TECHNOLOGY | FRENCH **GRANDE ÉCOLE** | FOUNDED IN 1919
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BIENVENUE EN FRANCE

MINISTÈRE DE L'ÉDUCATION NATIONALE, DE L'ENSEIGNEMENT SUPÉRIEUR ET DE LA RECHERCHE
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RÉPUBLIQUE FRANÇAISE

Master

Mechanical Engineering

COMPUTATIONAL MECHANICS

OBJECTIVES

This Master programme develops skills in advanced techniques in scientific computing at the interface between scientific disciplines for the modelling of mechanical engineering problems.

The courses cover the modelling and numerical simulation of complex mechanical systems (both fluid and solid) involving a possible coupling of different physics at different scales. The training is based on a global approach towards the issues associated with numerical modelling, from the construction of models and their discretization to the numerical resolution of discrete models, and to the mathematical analysis of models and approximation methods.
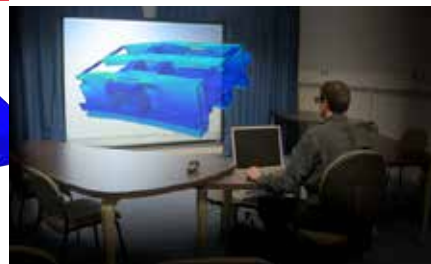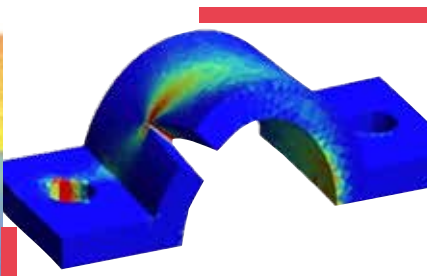
SKILLS

Specialism-specific

> Model solids and fluid flow problems

> Use advanced numerical and scientific technics to discretize and solve mechanical problems

> Master the mathematical analysis of models and approximation methods

General

> Identify models, perform simulation and analyse results

> Communicate comprehensive results in a meaningful way

> Undertake bibliographic surveys from international research and professional literature
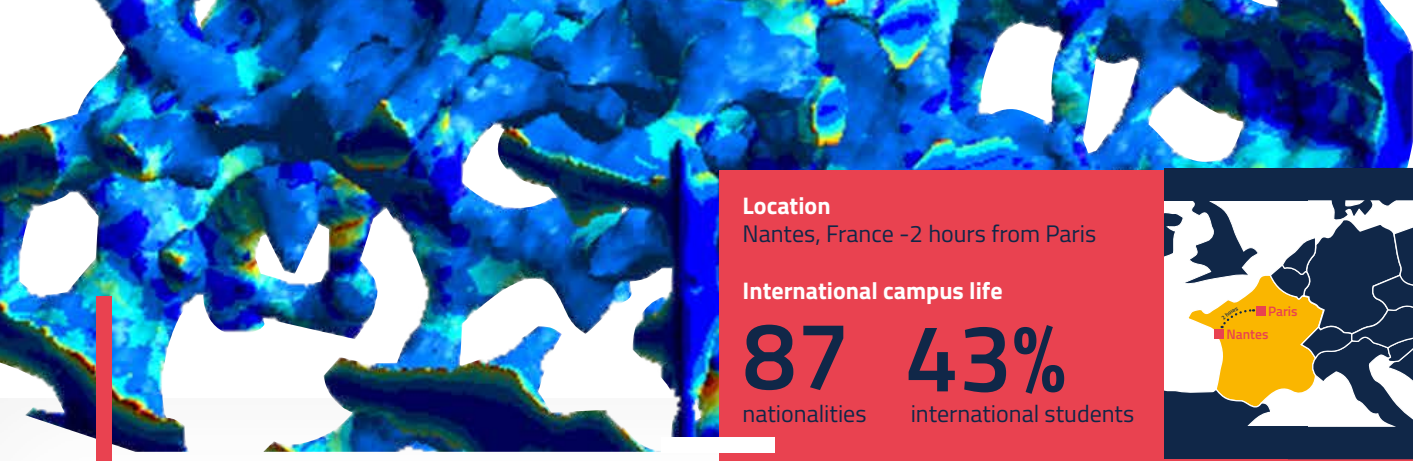
> Manage or be part of a project

JOB PROSPECTS & FURTHER PHD STUDIES

SECTOR: Aeronautics, Automotive, Transportation, Wind and Marine Energy, Software, Consulting.

FIELDS: Mechanical Engineering, Design, Research and Innovation.

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

Location
Nantes, France - 2 hours from Paris

International campus life

87
nationalities

43%
international students

EXAMPLES OF FINAL YEAR PROJECTS

5 to 6 month internship in Industry

> Optimization of mechanical Modelling Tools
> Numerical modelling of smart composite structures
> Improved workpiece design loop Structures in Thermoplastics for Automobile industry

5 to 6 month thesis in Research Labs

> Aerodynamic simulation of a wind turbine
> Development of optimization algorithms on tensor manifolds exploiting their fiber bundle structures
> Numerical simulation of composite impregnation using reactive resine

FACULTY, INDUSTRIAL PARTNERS AND RESEARCH LABS

This Master relies on the Centrale Nantes' faculty, staff and research facilities of the GeM Institute, the Jean Leray laboratory, the LHEEA Laboratory and the LS2N Institute. Centrale Nantes has several industrial partnerships with Airbus, Renault, Faurecia, Solvay, IFREMER, CETIM.

OTHER PROGRAMME INFORMATION

> Length of Studies: 2 years
> Language of instruction: English
> 3 semesters of courses and 1 semester of Master's thesis

Tuition & Fees - Scholarships - Application process - Deadlines

MORE INFORMATION AND FULL PROGRAMME:
www.ec-nantes.fr/masters

CONTACT: master.admission@ec-nantes.fr

CONTENT AND COURSES
(A Master Degree requires the validation of 120 ECTS credits)

M1 - AUTUMN SEMESTER	ECTS
Continuum Mechanics	5
Fluid Mechanics	5
Algorithmics for Engineering Modelling	4
Numerical Methods	4
Vibrations	4
Business Environment	4
Modern Languages	4
Conferences	-
M1 - SPRING SEMESTER	**ECTS**
Probability and Statistics	5
Numerical Analysis	5
Structural Mechanics	5
Fluid Mechanics 2	5
Programming and Algorithmics	4
Conferences and Initiation to Research	2
Modern Languages	4
M2 - AUTUMN SEMESTER	**ECTS**
Computational Configurational Mechanics	3
Computational methods for incompressible flows	3
Domain decomposition and iterative solvers	4
Extended Finite Element Method and level set techniques	3
Model Reduction	3
Numerical methods for simulation of coupled problems	4
Numerical methods for uncertainty quantification	3
Physical Modeling of Fluids	3
Modern Languages	4
M2 - SPRING SEMESTER	**ECTS**
Master Thesis or Industrial Internship	30

NB Course content may be subject to minor changes

RESEARCH INTENSIVE INSTITUTE OF TECHNOLOGY | FRENCH **GRANDE ÉCOLE** | FOUNDED IN 1919
This Master's programme is accredited by French Ministry of Higher Education.

BIENVENUE EN FRANCE

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MINISTÈRE DE L'ÉDUCATION NATIONALE, DE L'ENSEIGNEMENT SUPÉRIEUR ET DE LA RECHERCHE

CENTRALE NANTES

Master

Mechanical Engineering

ENERGETICS & PROPULSION

OBJECTIVES

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

Internal Combustion Engine and turbojet performance and efficiency are 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 curriculum offered in this program will provide an emphasis on all these processes and how they interact.
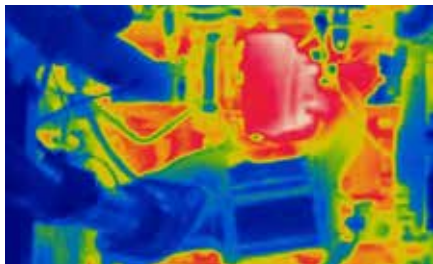
SKILLS

Specialism-specific

> Design engines and components
> Build and use simulation models of engines and powertrains
> Develop control strategies and calibrate ECU engines

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, Industrial engines, Aeronautics, Transportation, Power plants, Energy.

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

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

Location
Nantes, France -2 hours from Paris

International campus life

87
nationalities

43%
international students

EXAMPLES OF FINAL YEAR PROJECTS

5 to 6 month internship in Industry

> design of coolant, oil and intake air temperature control to simulate variations during one track lap for a formula one engine
> Experimental investigation regarding the influence of high temperature on the aqueous urea dosing unit for Daimler Trucks
> Demonstrator Development for Aircraft Jet engines Applications

5 to 6 month thesis in Research Labs

> Experimental study of wall wetting phenomenon on a port injection SI engine
> Experimental study and phenomenological modelling of wall heat transfer in an IC engine
> Experimental study of RCCI combustion with endoscopic investigations

FACULTY, INDUSTRIAL PARTNERS AND RESEARCH LABS

This Master relies on the Centrale Nantes' faculty, staff and research facilities of the IC Engines Research group of the LHEEA Laboratory, which has several industrial partnerships such as with Renault, Mann+Hummel, Stellantis and MAN-Energy Solutions.

OTHER PROGRAMME INFORMATION

> Length of Studies: 2 years
> Language of instruction: English
> 3 semesters of courses and 1 semester of Master's thesis

Tuition & Fees - Scholarships - Application process - Deadlines

MORE INFORMATION AND FULL PROGRAMME:
www.ec-nantes.fr/masters

CONTACT: **master.admission@ec-nantes.fr**

CONTENT AND COURSES
(A Master Degree requires the validation of 120 ECTS credits)

M1 - AUTUMN SEMESTER	ECTS
Continuum Mechanics	5
Fluid Mechanics	5
Algorithmics for Engineering Modelling	4
Numerical Methods	4
Vibrations	4
Business Environment	4
Modern Languages	4
M1 - SPRING SEMESTER	**ECTS**
Fluid Mechanics 2	5
Mechanical Design	4
Energetics	5
Propulsion	5
Hydrodynamics	5
Conferences and Initiation to Research	2
Modern Languages	4
M2 - AUTUMN SEMESTER	**ECTS**
Combustion	5
Gas Dynamics and heat transfer	5
Turbomachinery	5
Internal Combustion Engines	5
Hybrid Powertrain and Energy Management	3
Practical and Simulation	3
Modern Languages	4
M2 - SPRING SEMESTER	**ECTS**
Master Thesis or Industrial Internship	30

NB Course content may be subject to minor changes

RESEARCH INTENSIVE INSTITUTE OF TECHNOLOGY | FRENCH **GRANDE ÉCOLE** | FOUNDED IN 1919
This Master's programme is accredited by French Ministry of Higher Education.

Master in Sciences, Technologies and Health

Graduate programme | Master

Master

Marine Technology

Marine Nationale©

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 Master 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.

Marine Nationale©

Marine Nationale©
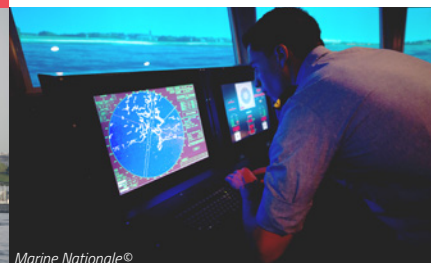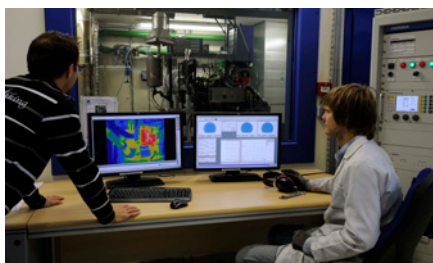
SKILLS

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: Marine Transportation, Marine Equipment, Wind and Marine Energy, Research and Innovation.

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

Location
Nantes, France - 2 hours from Paris
Lanvéoc-Poulmic, Brest, France -
4 hours from Paris
International campus life

87
nationalities

43%
international students

EXAMPLES OF FINAL YEAR PROJECTS

5 to 6 month Internship in Industry

> CFD optimisation process improvement: application to
an underwater vehicle

5 to 6 month thesis in a Research Lab

> Experimental methods using video analysis to measure
the flow-induced motion of plants
> Weak Scatter approach for the modelling of an OWC
> Evaluation of second generation stability criteria for
military ships

FACULTY, INDUSTRIAL PARTNERS AND RESEARCH LABS

This Master relies on the Centrale Nantes' and Ecole Navale's
faculty, staff and research facilities of the GeM Institute, the
LHEEA Laboratory and the IRENav Laboratory. Our industrial
partners are leading international companies involved in
ship building, ship design, marine engine industry or ship
operations such as Naval Group, Bureau Véritas, Hydrocean,
CGG, Man Diesel, STX and Pôle Mer Bretagne Atlantique.

PARTNERSHIP

École Navale in Lanvéoc-Poulmic close to Brest is the
French Naval Academy where French Navy officers are
trained. In Ecole Navale we deliver a nigh-level scientific
training and navigation knowledge in the maritime
environment.

At Centrale Nantes we provide a high-level naval engineer
training programme. You will have access to experimental
facilities such as a towing tank, a wave tank and internal
combustion engine test benches.

Students spend a substantial amount of time on both sites
Lanvéoc-Poulmic (around 30ECTS credits) and Nantes
(around 60ECTS credits) over the 2 years of the programme.

OTHER PROGRAMME INFORMATION

> Length of Studies: 2 years
> Language of instruction: English
> 3 semesters of courses and 1 semester of Master's
thesis

**Tuition & Fees - Scholarships - Application
process - Deadlines**

MORE INFORMATION AND FULL PROGRAMME:
www.ec-nantes.fr/masters

CONTACT: master.admission@ec-nantes.fr

CONTENT AND COURSES
(A Master Degree requires the validation of 120 ECTS credits)

M1 - AUTUMN SEMESTER	ECTS
Fluid Mechanics 1	5
Algorithmics for Engineering Modelling	4
Maritime Initiation and Leadership	4
Knowledge of Maritime Environment	5
Acoustics	4
Numerical Methods	4
Modern Languages	4
M1 - SPRING SEMESTER	**ECTS**
Fluid Mechanics 2	5
Energetics	5
Hydrodynamics (basics)	3
Training on Ship	2
Hydrodynamics	4
Propulsion	5
Electric Propulsion	2
Modern Languages	4
M2 - AUTUMN SEMESTER	**ECTS**
Training on ship	4
Hydrodynamics (advanced)	5
Thermal Machines	5
Maritime and navigation knowledge	6
Labs in Hydrodynamics and Propulsion Systems	6
Modern Languages	4
Conferences and visits	-
M2 - SPRING SEMESTER	**ECTS**
Master Thesis or Industrial Internship	30

NB Course content may be subject to minor changes

BIENVENUE EN FRANCE

MINISTÈRE DE L'ENSEIGNEMENT SUPÉRIEUR, DE LA RECHERCHE ET DE L'INNOVATION

CENTRALE NANTES

Master

Marine Technology

HYDRODYNAMICS FOR OCEAN ENGINEERING

Graduate programme | **Master** in Sciences, Technologies and Health

OBJECTIVES

This master programme provides advanced training on the typical problems of free-surface hydrodynamics applied to ocean engineering: ship resistance, seakeeping, marine renewable energy systems, etc.

Training involves theoretical courses together with the practical use of software to solve problems through a variety of numerical methods: e.g. boundary elements under potential flow or finite differences and finite-volumes for viscous flows. The unique academic large-scale facilities available at ECN: a towing tank and a large ocean wave basin will also contribute to the teaching programme. This way, physical, modeling, numerical and experimental aspects are studied.

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: Transportation, Renewable Energy, Classification societies, Civil Engineering, 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.

Location
Nantes, France -2 hours from Paris

International campus life

87
nationalities

43%
international students

CONTENT AND COURSES
(A Master Degree requires the validation of 120 ECTS credits)

EXAMPLES OF FINAL YEAR PROJECTS

5 to 6 month internship in Industry

> Naval numerical computations
> Development of a Fluid-Structure Interaction model for the optimisation of a Wave Energy Converter
> Coupling of VIV on the offshore wind turbine

5 to 6 month thesis in Research Labs

> Experimental investigation of improved dynamic response of barge type floating offshore wind turbine
> Modeling of the response on irregular waves
> Wave-current interactions in a HOS model

FACULTY, INDUSTRIAL PARTNERS AND RESEARCH LABS

This Master 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, DCNS, STX, IDeol, Technip, SAIPEM, etc.

OTHER PROGRAMME INFORMATION

> Length of Studies: 2 years
> Language of instruction: English
> 3 semesters of courses and 1 semester of Master's thesis

Tuition & Fees - Scholarships - Application process - Deadlines

MORE INFORMATION AND FULL PROGRAMME:
www.ec-nantes.fr/masters
CONTACT: master.admission@ec-nantes.fr

M1 - AUTUMN SEMESTER	ECTS
Continuum Mechanics	5
Fluid Mechanics 1	5
Algorithmics for Engineering Modelling	4
Numerical Methods	4
Vibrations	4
Business Environment	4
Modern Languages	4
M1 - SPRING SEMESTER	**ECTS**
Fluid Mechanics 2	5
Mechanical Design	4
Energetics	5
Propulsion	5
Hydrodynamics	5
Conferences and Initiation to Research	2
Modern Languages	4
M2 - AUTUMN SEMESTER	**ECTS**
General concepts of hydrodynamics	4
Water waves and sea states modelling	4
Wave-structure interactions and moorings	4
Numerical hydrodynamics	5
Experimental hydrodynamics	4
Modern Languages	4
Conferences	-
AUTUMN SEMESTER - SPECIALISATION COURSE (CHOOSE ONE OF THREE)	
Marine Renewable Energy	5
Naval Engineering	5
Hydrodynamics R&D	5
M2 - SPRING SEMESTER	**ECTS**
Master Thesis or Industrial Internship	30

NB Course content may be subject to minor changes

RESEARCH INTENSIVE INSTITUTE OF TECHNOLOGY | FRENCH **GRANDE ÉCOLE** | FOUNDED IN 1919
This Master's programme is accredited by French Ministry of Higher Education.

BIENVENUE EN FRANCE

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DE L'ENSEIGNEMENT SUPÉRIEUR
ET DE LA RECHERCHE

SHAKE THE FUTURE.

→ nantes
ensa
→ architecture

CENTRALE
NANTES

Master

City and Urban Environments

ARCHITECTURE, AMBIANCES, URBANITY

OBJECTIVES

This Master develops skills for addressing environmental and health issues in the context of sustainable urban development, in research and in urban design.

The programme is designed to provide the scientific theoretical knowledge and tools necessary to understand and address the environmental physical problems resulting from the ever increasing urban population. Various key disciplines such as urban microclimatology, wind and ventilation in urban areas, human ecology of urban spaces, sunlight and illumination are taught through advanced lectures and research work in laboratories which are renowned in these fields.
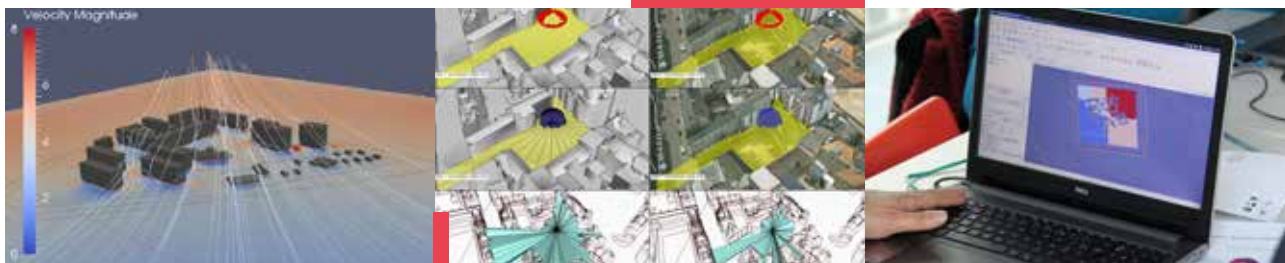
SKILLS

Specialism-specific

> Understand and master the theoretical and methodological foundations of urban environments through the problematic of ambiances

> Master the physical phenomena that contribute to the comfort and to the sensitive perception of the developed or built environment

> Know how to characterise urban ambiances

General

> Express assumptions to solve and analyse a problem

> Communicate comprehensive results in a meaningful way

> Undertake bibliographic surveys from international research and professional literature

> Carry out an urban project through its environmental challenges

JOB PROSPECTS & FURTHER PHD STUDIES

SECTOR: Urban planning and design, Urban environment, Architecture.

FIELDS: Urban planning, Microclimatology, Comfort conditions in urban areas.

JOB POSITIONS: Urban planner/architect in consulting office or groups specialized in environmental engineering; assistance to contracting authorities; Research and academic career (post PhD).

Location
Nantes, France -2 hours from Paris

International campus life

87
nationalities

43%
international students

CONTENT AND COURSES
(A Master Degree requires the validation of 120 ECTS credits)

M1 - AUTUMN SEMESTER	ECTS
Fluid Mechanics	5
Algorithmics for Engineering Modelling	4
Energetics and Building heat transfers	4
Introduction to Geographic Information Sciences	5
Introduction to research	4
Business Environment	4
Modern Languages	4
M1 - SPRING SEMESTER	**ECTS**
Hydrology and transfers in soils	4
Introduction to Computational Fluid Dynamics	5
Urban Realities Review	4
Urban Management and Planning	4
History of the city	5
Social Sciences for the city	4
Modern Languages	4
M2 - AUTUMN SEMESTER	**ECTS**
Research methods and practice	4
Ambiance, ambiances	5
Urban project 1: theoretical approach and environmental indicators	4
Urban project 2: design and evaluation	5
Urban environment 1: sunlight & sound environment	4
Urban environment 2: wind & microclimate	4
Modern Languages	4
Conferences	-
M2 - SPRING SEMESTER	**ECTS**
Master Thesis or Industrial Internship	30

EXAMPLES OF FINAL YEAR PROJECTS

5 to 6 month internship in Industry
> Considering exterior air quality during urban design
> Housing comfort conditions analysis in rural areas (district of Bogota, Colombia)

5 to 6 month thesis in Research Labs
> Lumiducs: history and challenges in modern cities
> Collective manufacturing of space: between urban initiatives and risks
> Architectural angle at the cross-roads: the urban angle as an object of study of the urban space

FACULTY, INDUSTRIAL PARTNERS AND RESEARCH LABS

This Master relies on the Centrale Nantes' faculty and the School of Architecture of Nantes (Ensa Nantes) staff and research facilities of the LHEEA Laboratory, the AAU laboratory and the IRSTV (Research Institute on Urban Sciences and Technology). Centrale Nantes and Ensa Nantes have several professional partnerships such as with EDF, Veolia, ENERCON, Nantes Métropole, Air Pays de la Loire, CEREMA...

PARTNERSHIP

Ensa Nantes

OTHER PROGRAMME INFORMATION

> Length of Studies: 2 years
> Language of instruction: First year English and French, second year French
> 3 semesters of courses and 1 semester of Master's thesis

Tuition & Fees - Scholarships - Application process - Deadlines

MORE INFORMATION AND FULL PROGRAMME:
www.ec-nantes.fr/masters

CONTACT: master.admission@ec-nantes.fr

NB Course content may be subject to minor changes

RESEARCH INTENSIVE INSTITUTE OF TECHNOLOGY | FRENCH **GRANDE ÉCOLE** | FOUNDED IN 1919
This Master's programme is accredited by French Ministry of Higher Education.

BIENVENUE EN FRANCE

MINISTÈRE DE L'ÉDUCATION NATIONALE, DE L'ENSEIGNEMENT SUPÉRIEUR ET DE LA RECHERCHE
Liberté • Égalité • Fraternité
RÉPUBLIQUE FRANÇAISE

Master

City and Urban Environments

ATMOSPHERE, WATER AND ENVIRONMENT

OBJECTIVES

This Master develops skills for addressing environmental and health issues in the context of sustainable urban development, in research and in urban engineering.

The programme is designed to provide the scientific theoretical knowledge and tools necessary to understand and address the environmental physical problems resulting from the ever increasing urban population. Various key disciplines such as urban hydrology, urban atmosphere, building heat transfer and pollution of air water and soils are taught through advanced lectures and research work in laboratories renowned in these fields.
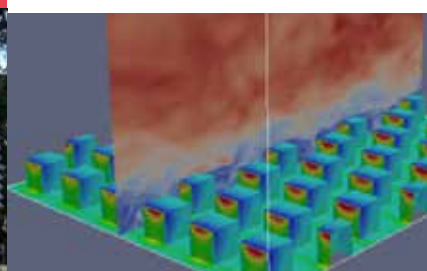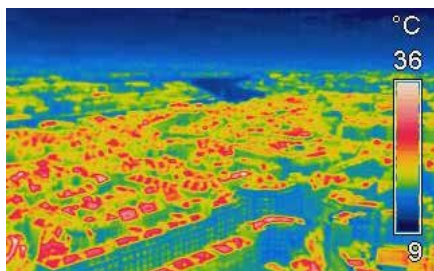
SKILLS

Specialism-specific

> Understand the physics and dynamics of fluids in urban environments

> Master analysis and modelling tools for hydrology and atmospheric sciences in urban environments

> Learn techniques of water management, treatment of soil, water and air, and mitigation of the urban heat island

General

> Express assumptions to solve and analyse a problem

> 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: Urban planning and design; Urban environment, Energy, soil and water management.

FIELDS: Urban planning, Environmental fluid mechanics, Hydrology, Microclimatology, Air quality.

JOB POSITIONS: Engineer in consulting office or groups specialized in environmental engineering, Engineer in urban design and planning office or local authorities; Research and Innovation Engineer or Research and academic career (post PhD)

Location
Nantes, France - 2 hours from Paris

International campus life

87 nationalities

43% international students

Master in Sciences, Technologies and Health

EXAMPLES OF PROJECTS DURING INTERNSHIPS

5 to 6 month internship in consulting offices and local authorities

> Integration of urban microclimate in building energy simulation.
> Climate and Energy territorial plan: adaptation to Urban Heat Island

5 to 6 month thesis in Research Labs

> Analysis of fluid exchange between a street canyon flow and the atmospheric boundary layer
> Model reduction for thermal modelling of urban surfaces
> Treatment of micropollutants by vegetation in run-off water management device.

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Algorithmics for Engineering Modelling	4
Energetics and Building heat transfers	4
Introduction to Geographic Information Sciences	5
Introduction to research	4
Business Environment	4
Modern Languages	4
Conferences - Visits	-
M1 - SPRING SEMESTER	**ECTS**
Hydrology and transfers in soils	4
Introduction to Computational Fluid Dynamics	5
Urban Realities Review	4
Urban Management and Planning	4
Fluid Mechanics 2	5
Environmental Data Analysis	4
Modern Languages	4
M2 - AUTUMN SEMESTER - IN FRENCH	**ECTS**
Turbulence: theory, modelling and analysis	4
Meteo & atmospheric boundary layers	4
Urban pollution	5
Urban water management and modelling	5
Urban climate and energy	4
Modern languages	4
Project	4
Conferences	-
M2 - SPRING SEMESTER	**ECTS**
Master Thesis or Industrial Internship	30

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