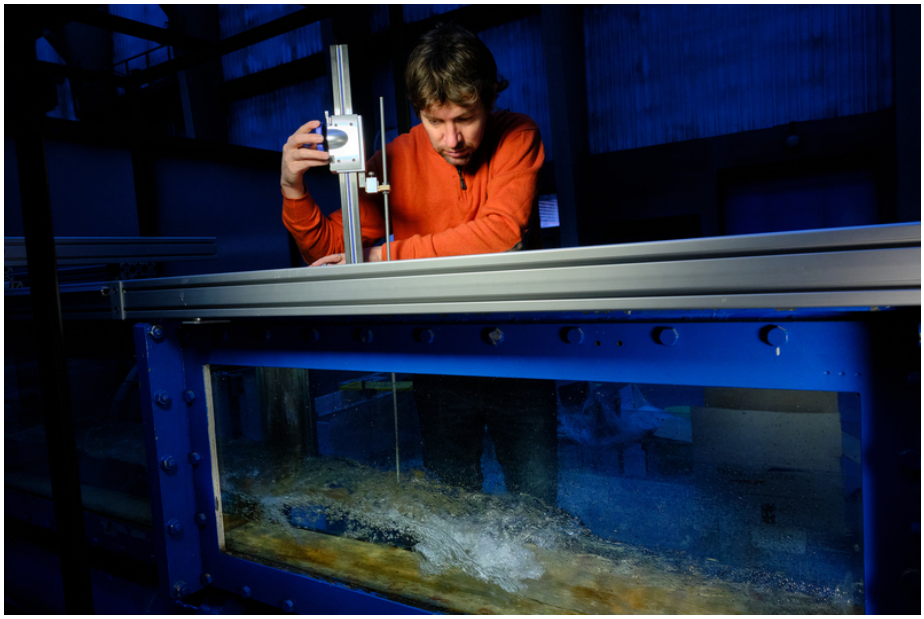
International Master Water and Wind Engineering

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



The "Water and Wind Engineering" master's degree is part of the "Risk and Environment" masters. It offers a comprehensive introduction to the broad field of environmental fluid mechanics, before offering a specialisation in water or wind engineering.

Environmental fluid mechanics plays a key role in most **large infrastructure projects**: impact of wind on structures, transport and dispersion of pollutants in the atmosphere, flooding of urban areas, coastal erosion...

The projections related to **climate change** all suggest that extreme events are likely to become more frequent and more intense. There is therefore a permanent need for highly qualified engineers capable of **understanding and modelling these phenomena** in all their complexity.

The programme is jointly run by Centrale Lyon and INSA Lyon, which is taught entirely in English. It is delivered on the Doua campus in Villeurbanne and on the Centrale Lyon campus in Écully.

Program

Environment, infrastructure, pollution, climate, geological hazards

This program, entirely in English, offers in-depth training over 4 semesters. It combines **theory**, **laboratory studies**, **numerical simulations** and **research projects**, with opportunities to study internationally. Key disciplines include **fluid mechanics**, **thermodynamics**, **meteorology**, **oceanography**, **hydraulics** and **hydrology**.

The master's degree in risk and the environment is based on established **research collaborations** and a shared commitment to imparting knowledge to students at the start of their professional careers. A significant part of the teaching is dedicated to **practical laboratory work**, enabling **work in small groups** and the use of various **experimental facilities**. The international nature of the program reflects the importance of integrating an international dimension into the training of future engineers.

Two specialisation choices:

- **Water Engineering**
- **Wind Engineering**

Semesters 1 and 2

Semester 1: core courses

Scientific courses

- Mathematics for engineers
- Probabilities and statistics
- Computing for engineers
- Fundamental fluid mechanics
- Advanced fluid mechanics
- Design project

Cross-disciplinary courses

- Environmental economics
- Environmental law
- Risk and decision
- Languages (French/English)

Semester 2: optional courses

Selection of elective courses (see the syllabus for more details on their content) providing an introduction to the 2nd-year specialization, including:

Core courses

- Research project (2 months)
- Computational fluid dynamics

Optional courses

Selection of elective courses (see the syllabus for more details on their content) providing an introduction to the **second-year specialization**, including:

- Introduction to meteorology and oceanography
- Physics and modeling of free-surface flows
- Geographic information systems
- Space physics and solar-terrestrial coupling
- Urban water management
- Order, chaos and fractals

Transversal courses

- Languages (French/English)
- Seminars

Semesters 3 and 4 (depending on chosen specialisation)

Water engineering Wind engineering

The "Water Engineering" specialization focuses on water flows in various environments. It includes courses in **river hydraulics**, **coastal engineering**, **oceanography** and **turbulent flows**. Options cover **meteorology**, **climate change**, and **urban hydrology** . This program focuses on sustainable water resource management and climate impacts.

Semester 3: specialization

Semester of specialization, either in Lyon (Centrale Lyon / INSA) or in one of our partner institutions. The general themes of the specialization are as follows:

Optional courses

Selection of **6 elective courses** from the list (see the syllabus):

- River hydraulics
- Ocean and coastal engineering
- Oceanography
- Physics of turbulent flows
- Hydrology and hydrogeology
- Air quality
- Resources, energy, climate and society
- Urban hydrology

Optional courses II

Selection of **4 elective courses** from the list (see the syllabus):

- Two courses from the following:
  - Urban flooding
  - Wind and hydraulic machines (compulsory course)
  - Climate change

- Boundary layer meteorology
- Statistics applied to engineering

Semester 4: internship

6-month internship in industry or in a laboratory.

The "atmospheric engineering" specialization trains experts with a focus on **renewable energy,** the impact of **climate change** and **turbulent flow physics**. Students can customize their training by choosing options such as **river hydraulics**, **oceanography**, **fluid-structure interaction**, or **external aerodynamics**. This multidisciplinary training prepares students for wind engineering while, integrating issues of sustainability, technological innovation and environmental risk management.

Semester 3: specialization

Semester of specialization, either in Lyon (Centrale Lyon / INSA) or in one of our partner institutions. The general themes of the specialization are as follows:

Optional courses I

Selection of **6 elective courses** from the list (see the syllabus):

- Boundary layer meteorology
- Climate change
- The physics of turbulent flows
- Hydrology and hydrogeology
- Air quality
- Resources, energy, climate and society
- Urban hydrology

Optional courses II

Selection of **4 elective courses** from the list (see the syllabus):

- External aerodynamics
- Wind and hydraulic machines (compulsory course)
- Fluid-structure interaction

- Environmental acoustics
- River hydraulics
- Oceanography
- Ocean and coastal engineering
- Statistics applied to engineering

Semester 4: internship

5-month internship in industry or in a laboratory.

Diploma and certification

This program awards a Master's degree that is certified by the French state and internationally acknowledged.

Career opportunities

- Civil engineering, energy and transport sectors
- River management, coastal protection, urban water management
- Renewable energies - wind turbines, hydropower, marine energy
- Urban environment - urban climatology, air quality, building ventilation
- Research and development - PhD, university sector, research centers

Focus

This master's program is provided by **five international partner institutions**:

Instituto Politecnico di Torino, Università di Genova, Karlsruher Institut für Technologie, University of Surrey, Budapest University of Technology and Economics.

And by **six renowned research laboratories**: LMFA, DIATI, GS-WinDyn, KIT IFH, Centre for Aerodynamics and Environmental Flow (University of Surrey) and the Department of Hydraulic and Water Resources Engineering (Budapest University of Technology and Economics).

Admission requirements and application

Pre-requisites

- Master 1: Bachelor's degree in a scientific subject related to the Master's topics. English level B2.
- Master 2: Successful M1 in a subject related to the Master's topics. English level B2.

Application

Applications are considered on the basis of a portfolio.

Find out how to apply

Tuition fees

Acknowledging and anticipating your expenses is essential before committing to a training course with confidence.

Find out more about Master's course fees Discover the average budget for studies at Centrale Lyon

Administrative contact

Education department - International Masters

Information and registration

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Useful link

- Discover the training syllabus