MASTER SOAC
ATMOSPHERE, OCEAN & CLIMATE SCIENCE

Ecully campus

MASTER IN PHYSICS AND CHEMISTRY APPLIED TO THE ATMOSPHERE AND THE OCEANS

- Jointly accredited University Claude Bernard Lyon 1 and the Ecole Centrale de Lyon
- 4 semesters, taught in English at Lyon 1 and the Ecole Centrale de Lyon
- Theory and practice, with extensive laboratory studies and numerical simulations
- At least 3 months of project work and 6 months of internship or laboratory research project

OBJECTIVES

Provide the next generation of scientists and engineers with the multidisciplinary knowledge and skills in Physics, Chemistry and Mechanics needed to understand the fundamental processes involved in small scale and large-scale processes in the atmosphere and the oceans. Students will learn about the interactions between these, and how this influences climate change, and how climate change then modifies these processes. Students will also discover the different measurement techniques, and the essential role played by observation in our modelling of the atmosphere, the oceans and our climate.

SCIENTIFIC DISCIPLINES

Physics
Chemistry
Fluid Mechanics
Thermodynamics
Meteorology
Oceanography

APPLICATIONS

Air quality
Atmospheric sensing
Weather forecasting
Climate change
Ocean mixing
Natural hazards & environmental risk
Renewable energies

PREREQUISITES

Bachelor of Science

Preferably in **Physics, Chemistry, Mechanics, Engineering Science, Earth sciences, Mathematics**

Minimum Level in English: B2

ÉCOLE CENTRALE LYON

COURSE PROGRAMME

1ST YEAR | 2ND YEAR

S1
September - January

- Mathematics 1
- Mathematics 2
- Chemical kinetics
- Fluid mechanics
- Atmospheric physics
- Climate physics

S2
February - June

- Atmospheric chemistry
- Fundamentals of spectroscopy
- Introduction to meteorology and oceanography
- Geographical Information Systems
- **2 Electives, chosen from:**
  - Physics and modelling of free surface flows
  - Space physics and solar-terrestrial coupling
  - Chaos and fractals
  - Physico-chemical kinetics in heterogeneous media
  - Physics of water
  - Water chemistry
  - ...
- Numerical methods and computing
- Research project (3 months)
- Languages (French/English)

S3
September - March

Choice of three specializations:

Atmospheric Sciences
- Atmospheric Chemistry II
- Atmospheric Physics II
- Atmospheric observations & metrology
- Atmospheric Boundary Layer
- Atmospheric Pollution
- Environmental Legislation
- Environmental Hazards
- Applied engineering statistics
- Physics of Turbulence
- FLE/Languages
- Project

Ocean Sciences
- Physics of water
- Atmosphere-Ocean interactions
- Ocean and coastal engineering
- Teledetection
- Oceanography
- Atmospheric Boundary Layer
- Hydrology & Hydrogeology
- Applied engineering statistics
- Physics of Turbulence
- FLE/Languages
- Project

Climate Sciences
- Atmospheric Physics II
- Atmosphere-Ocean interactions
- Radiative transfer
- Atmospheric Boundary Layer
- Climate change & geo-engineering
- Teledetection or Big Data
- Applied engineering statistics
- Physics of Turbulence
- FLE/Languages
- Project

S4

Research project in a laboratory or internship in the R&D department of a company

GRADUATES FROM THE MASTER PROGRAMME WILL HAVE ACQUIRED A WIDE RANGE OF SKILLS:

- A sound theoretical understanding of the basic physical processes involved in atmosphere, ocean and climate science
- The ability to mobilise that understanding to explain and model complex multi-disciplinary physical problems
- The capacity to specify and interpret data from observations, and incorporate that data into the modelling process
- The skills in project management that will be needed to develop and implement these different activities, in a multidisciplinary context

CAREER OPPORTUNITIES FOR GRADUATES:

- Research & development – PhD, academic sector, research centres (about 50% of graduates from this master continue with a PhD)
- Instrumentation engineering
- Project engineers – energy, renewable energy, infrastructure
- Regulatory – environmental impact assessment, air quality monitoring
- Nuclear industry – risk assessment, environmental monitoring

CONTACT

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