MONTPELLIER CAMPUS

MAJOR

Energy & Environment

#WASTE-TO-ENERGY #SENSOR #RENEWABLEENERGY #ENERGYEFFICIENCY
#DIGITAL #ECOLOGICALTRANSITION #CIRCULAR ECONOMY

epf
ENGINEERING SCHOOL
Creating the future together

COURSE OBJECTIVES

This major **prepares flexible and adaptable engineers** who are capable of solving new industrial challenges related to the ecological transition. Particular emphasis is placed on the role of digital transformation in achieving this.

Upon completion of this major, graduates will have acquired scientific, technical, and management skills & understanding in the following areas:

- **Industrial approaches** to production methods and processes, and energy systems;
- The challenges of electricity, water and gas transmission and distribution networks;
- **Political, economic, geopolitical, and regulatory aspects** of energy and the environment;
- **Mineral and energy resource management challenges** from extraction to operations and industrial production, including industrial ecology, life cycle assessment (LCA) and material and energy recovery techniques.

COURSE DESCRIPTION

The major spans two academic years structured around **two academic semesters and two semesters of internships.** The Year 4 & 5 programs of study include 4 compulsory modules. A track selected in each semester from a choice of three is designed to meet your individual preferences:

- Energy
- Environment
- Energy & environment

Depending on your preferences and career aspirations, our optional modules will enable you to:

- **orient your studies** towards the energy and/or environmental sectors
- **benefit from a broad vision of these interconnected domains** by choosing modules from both areas

Certain optional modules are taught in English (EN), others in French (FR) and some in both languages (FR&EN). Students can choose to mix tracks between Years 4 and 5.

The energy systems covered in Year 4 focus on electricity production, while Year 5 focuses more on thermal aspects (heating and cooling).

The maximum capacity of a module is 36 students. Beyond that, classes will be split into two. If less than 12 students are enrolled, the optional modules will not be opened.

YEAR 4 . COMPULSORY MODULES

Renewable energies	**66 hours I 5 ECTS**
· Photovoltaic · Wind power · Electrical storage	
Digital technologies	**63 hours I 5 ECTS**
· Spatial dynamic modeling · Data Science · IT for Green seminars	
Humanities & Business	**53 hours I 5 ECTS**
· Calls for tender · Financial management · French as a Foreign Language · Communication skills · English	
Bilan	**182 hours I 5 ECTS**

YEAR 4 - 3 TRACKS

. ENERGY TRACK

New energies	**63 hours I 5 ECTS**
· Marine energies · Hydrogen & fuel · Cells · Smart grid management	
Nuclear Energy	**63 hours I 5 ECTS**
· Electricity production · Decommissioning · Radioactive waste management	
Project (Major)	**150 hours I 5 ECTS**
· Project management · Supervision + oral presentation · Individual & group work	

. ENERGY & ENVIRONMENT TRACK

Transitional energies	**63 hours I 5 ECTS**
· Marine energies · Hydrogen & fuel · Cells · Smart grid management	
Environmental impact and innovation	**60 hours I 5 ECTS**
· Carbon footprint · Life cycle analysis · Eco-innovation, eco-design	
Project	**150 hours I 5 ECTS**
· Project management · Supervision + oral presentation · Individual & group work	

. ENVIRONMENT TRACK

Global Water Cycle	**68 hours I 5 ECTS**
· Hydrology · River hydraulics · Climatology	
Environmental impact and innovation	**60 hours I 5 ECTS**
· Carbon footprint · Life cycle analysis · Eco-innovation, eco-design	
Project	**150 hours I 5 ECTS**
· Project management · Supervision + oral presentation · Individual & group work	

YEAR 5 - COMPULSORY MODULES

Regulations and norms	**64 hours I 5 ECTS**
• QSE management systems • International environmental law & geopolitics • Energy markets • Environment & Industry (Installations Classified for the Protection of the Environment - ICPE)	
Circular Economy	**60 hours I 5 ECTS**
• New business models and innovation • Industrial ecology & regional planning • Waste management	
Humanities & Business	**65 hours I 5 ECTS**
• Employability • Employment law • Visits & seminars • Sales techniques • English	
Total	**189 hours I 5 ECTS**

YEAR 5 - 3 OPTIONAL TRACKS

. THERMAL ENERGY TRACK

Thermal energy	**60 hours I 5 ECTS**
• Solar thermal • Geothermal • Thermal storage and heating networks	
Sustainable housing	**63 hours I 5 ECTS**
• Lifecycle assessment of buildings (LCA) • Dynamic thermal simulation • Building energy efficiency	
Project	**150 hours I 5 ECTS**
• Supervision • Oral presentations • Individual & group work	

. ENERGY & ENVIRONMENT TRACK

Sustainable housing	**66 hours I 5 ECTS**
• Lifecycle assessment of buildings (LCA) • Dynamic thermal simulation • Building energy efficiency	
Resource management and biodiversity	**63 hours I 5 ECTS**
• Mineral resources • Bioprocesses & biofuels • Ecology & biodiversity	
Project	**150 hours I 5 ECTS**
• Supervision • Oral presentations • Individual & group work	

. ENVIRONMENT TRACK

Small Water Cycle	**63 hours I 5 ECTS**
• Water Network • Water Treatment • Water Re-use	
Resource management and biodiversity	**66 hours I 5 ECTS**
• Mineral resources • Bioprocesses & biofuels • Ecology & biodiversity	
Project	**150 hours I 5 ECTS**
• Supervision • Oral presentations • Individual & group work	

YOUR FUTURE AFTER THE ENERGY & ENVIRONMENT MAJOR:

All sectors of activity must now take into account the evolutions linked to the energy transition and environmental restrictions. All categories of companies are concerned, from large industrial groups to SMEs, VSEs and start-ups, thus offering exciting graduate engineering positions in the areas of energy efficiency and sustainable development. In the energy and environment sectors, there are many different types of career opportunities, ranging from conceptual jobs in applied research or design offices, to «field» jobs in maintenance and systems operations, or jobs with an economic and strategic component.

GROWTH SECTORS

- Nuclear
- Energy conversion
- Waste (collection, sorting, incineration, recovery)
- Regional planning
- Corporate social responsibility, eco-design, LCA
- Rehabilitation of industrial sites
- Wastewater treatment, sanitation, pollution control, treatment
- Renewable energies
- Energy management

JOBS OF THE FUTURE

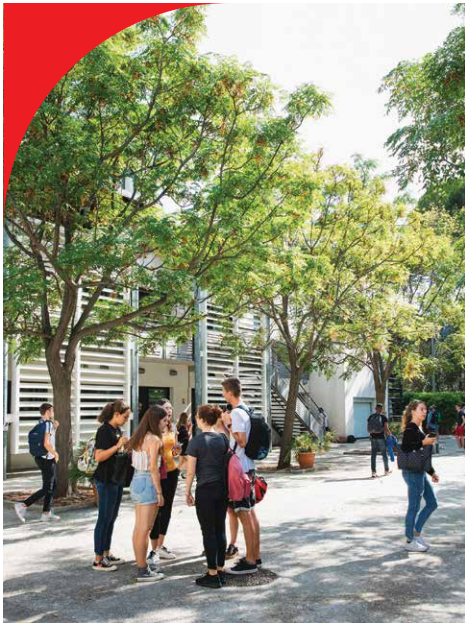
- Design engineer
- Research engineer
- Project leader
- Business manager
- Project manager
- Consultant
- Operations and/or maintenance manager

REAL-WORLD PROJECTS TO DEVELOP YOUR EMPLOYABILITY

Each academic semester, you will work on a project in collaboration with a company. This project is the main focus of the semester, **enabling you to put into practice the knowledge and expertise** developed during the semester and according to your choice of track.

Examples of projects:

- **KYNAROU:** proposal for a drinking water production system in India (water treatment - removing hardness).
- **FARMEX:** design of a positive energy water treatment plant to facilitate access to drinking water in sub-Saharan Africa.
- **SEGULA TECHNOLOGIES:** study of potential environmental impacts following the installation and operation of floating photovoltaic power plants (FPV) on reservoirs upstream of a hydroelectric dam, in France.
- **VH 93:** Development of a tidal turbine equipped with a Savonius rotor adapted for electricity production in small rivers (finite element modeling and 3D printing).
- **GREnADE:** development of an intelligent system for remote irrigation control.
- **GENSUN:** comparative analysis of the performance of photovoltaic fields between the design and operation phases.



Mauna REVEIL

2022 Graduate

“ From the study of different types of energy to waste management and the study of water treatment, **the Energy and Environment major covers a wide range of fields, enabling you to develop expertise in the key issues facing our society.**

Coming from Tahiti, the Ocean has a central place in my life as it connects the islands, feeds the people and allows me to practice my passion which is surfing. However, the islands are strongly dependent on fossil fuels.

Through my internship at YS *Énergies Marines Développement*, I was able to combine my passions and my work by contributing to the development of electricity production projects using marine currents (tidal stream turbines) and waves (wave engine). Although this field is still in its infancy, it has the potential to reduce our dependence on fossil fuels by using the energy of the ocean. Working in this innovative sector, with actors from all walks of life, allowed me to grow during my internship and to discover a career path that matches my interests. ”

PRACTICAL DETAILS

- **Duration of studies:** 2 years
- **Location:** Montpellier Campus

ANY QUESTIONS?

Sébastien DONIO
sebastien.donio@epf.fr

Julia MOUTON
julia.mouton@epf.fr