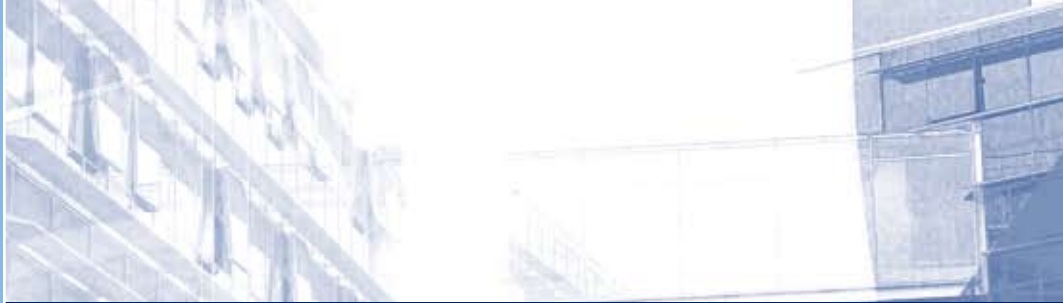


# EMNantes



# GE

**Environmental  
Engineering**



ECOLE DES MINES DE NANTES

# The GE option



In this option, students train to become engineers in a dynamic sector: the treatment of pollution (water, air, waste, noise) and environmental management (eco-assessment, eco-design). The GE option looks both at process engineering, involving the processes themselves, which help limit emissions by industry, and treatment processes, once pollution has occurred. It also involves environmental management, integrated systems (quality, safety, environment), sustainable development policies, environmental assessments and impact reports, as well as regulatory monitoring.

## > Career Opportunities

In a sector where national spending is growing by nearly 5% per year, the number of jobs is increasing steadily. There are numerous employment opportunities with organizations involved in environmental management:

- **Eco-industries**, which manufacture and manage waste recycling and treatment facilities;
- **Businesses, which due to their size and their impact on the environment**, have dedicated departments (often in conjunction with health and safety), in particular Classified Facilities for Environmental Protection;
- **Public or private organizations and laboratories**, doing research and development in these fields; engineering, auditing or consulting firms, including public agencies such as the Agence de l'Eau, Ademe, BRGM, etc.;
- **Central or Local Government**
- **Consulting firms** that provide environmental engineering and design services.

## > Jobs for Tomorrow and the Future

In light of changes in environment-related jobs, the Environmental Engineering option trains engineers able to:

- Design, model, optimize and implement effluent treatment processes (water, waste, air) and make sustainable use of resources (clean processes);
- Develop and implement environmental and sustainable development policies in businesses (ISO 14000, Integrated Management, Eco-Design, Life Cycle Analysis);
- Integrate economic, technical and regulatory requirements into solutions for environmental problems (classified facilities, energy efficiency management).



## > The Curriculum

Created in 1998, the option curriculum is based on process engineering and environmental management to train professionals to carry out environment-related technological projects. In the final year of study, the courses focus on:

- **treatment of environmental pollution,**
- **process control,**
- **environmental management.**

Emphasis is placed on process modeling and control. Given the social dimension of the projects, human and social sciences also hold an important position.

The program includes a number of site visits, case studies, situation scenarios and international group projects, in anticipation of the future working methods of the engineers. Lectures by outside speakers from a variety of environmental domains are an important feature of the program.

The graduate project reinforces the ties established between the School and the national and international businesses and organizations involved in the option.

<b>DEVELOPING TREATMENT PROCESSES</b>
Designing innovative treatment processes
Designing industrial pollutant elimination systems
Developing and implementing solutions for air, water and waste problems
<b>CONTROL AND MODELING</b>
Modeling for understanding and predict systems
Measuring strategic variables and the impacts of a process
Optimizing process-related consumption and discharge
<b>ORGANIZE AND MANAGE THE ENVIRONMENT AND RISKS</b>
Managing projects using an integrated approach (health, safety, quality, environment)
Presenting environmental assessments and communicating in crisis situations
Anticipating regulatory requirements
International issues (Kyoto Protocol, European legislation)
Integrating the business dimension into the implementation of an environmental management system
Analyzing environmental data



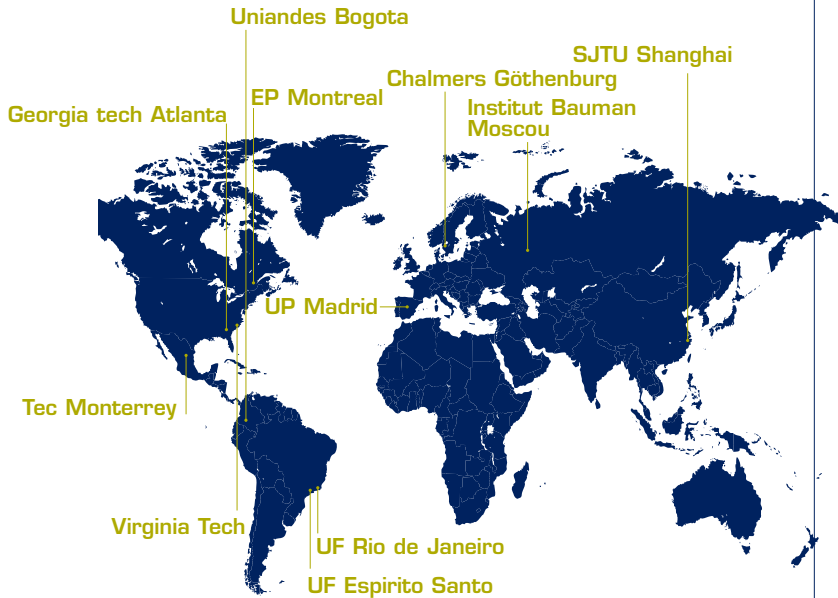
Valérie Héquet,  
Program Head

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“The profile of an environmental engineer is grounded in expertise in developing solutions for reducing industrial discharges and reaching sustainable levels of energy and materials consumption. This is based in particular on knowing how to act and communicate within organized structures subject to outside regulatory or market requirements, as well as crisis situations.”

## > Beyond Borders

The option is very active in a number of double degree programs. The program attracts foreign students, in particular from the Universidad de los Andes in Bogotá, and French students can complete part of the curriculum in a partner university and intern with a foreign research lab or firm.



### > Double degrees



## “She is an extremely efficient young woman”

Luc Delcourt, Somanu, subsidiary of Areva

Maria Carolina arrived at the Ecole des Mines in Nantes in 2003 to complete a program she had begun at the Universidad de los Andes in Bogotá. She decided to carry out her industrial project at Somanu, an Areva subsidiary in charge of maintenance. “The nuclear group had decided to earn ISO 14001 certification for all its sites with significant environmental issues,” she explains. “My mission was to prepare for the certification process for the Somanu site in Maubeuge, where I was working with another former student of the Ecole des Mines in Nantes. I had a basic knowledge of environmental systems management. But nuclear sites have really specific issues...”

Indeed, at a site that receives and processes components that present traces of radioactivity in special rooms in order to prolong their life, the conditions are quite particular. But Maria Carolina rose to the challenge, says her industrial mentor, Luc Delcourt, who now works in China. “She did a perfect job,” he recalls. “The quality of her work was excellent, combining thoroughness and speed. She is an extremely efficient young woman.” She obviously did a great job, because as soon as she graduated, she was hired by the parent company Areva to work in Finland. “I deal with certification here too, but this time in the area of reactor construction,” she says. The site has been ISO 14001 certified since December 2005, but we have to adapt to changes in activity. The regulations are obviously very strict. We have to write up all the procedures, stay in contact with the clients and supervise suppliers. It’s not boring at all!”

## > Research

The process engineering portion of the GE option is based on research topics developed by the “Fluid Dynamics and Mass Transfer” and the “Process Engineering” groups at the Process Engineering – Environment – Food Processing Lab, - GEPEA, UMR CNRS 6144 (<http://gepea.univ-nantes.fr>), whose Environment and Energy Systems Department is actively involved.

Roughly 15% of the students choose to specialize in research. They can test their abilities in this field by starting, in their final year of studies, a masters in Water Chemistry/Microbiology, Process Engineering, or Urban Environment Techniques and Science. Some students have continued with doctoral studies and now pursue an academic career.



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