



SCIENCE, TECHNOLOGY, HEALTH

# GREEN Graduate Program - Sustainable Geoennergies (SAGE)

Master Geoennergies



ECTS  
120 credits



Duration  
2 years



Component  
Collège  
Sciences et  
Technologies  
pour l'Energie et  
l'Environnement  
(STEE)



Language(s)  
English

## Presentation

In 2022, the University of Pau and Pays de l'Adour opened a **5-year Master's degree + PhD program of excellence in a variety of disciplines linked to energy and the environment research, the GRaduate School for Energy and Environmental iNnovation (GREEN).**

**Every student, whether French or foreign, accepted into the program will be offered a €5,000 stipend per year for the first two years.**

**Apply here from October to March**

*N.B. Our Master's programs may not open if enrollment is too low.*

The **Sustainable Geo-Energies (SAGE) graduate program**, which builds on the well-established Geoennergies master's program, offers extensive training in all the scientific disciplines involved in the sustainable use of the subsurface in the context of energy transition.

To reconcile climate objectives with ever-increasing energy demand, the **capture and long-term geological storage of CO<sub>2</sub> (CCUS)**, the **seasonal storage of gases including hydrogen and biomethane**, and **deep geothermal energy production** are all examples of industrial applications currently under rapid development and requiring intensive applied and fundamental research.

With this program, unique in France, we offer students the opportunity to acquire cutting-edge scientific expertise in the following fields:

- \* Reservoir geology,
- \* Geophysical and geochemical monitoring of geological reservoirs,
- \* Passive and reactive fluid transport in porous media,
- \* Chemical engineering.

This academic knowledge, combined with the numerical and experimental know-how acquired in the research laboratories supporting the program (**Laboratory of Complex Fluid and their Reservoirs, Laboratory of**



Mathematics and their Applications), will provide a unique set of skills for tackling the scientific challenges posed by the use and storage of geoennergies.

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## Objectives

- \* *To contribute to the development of new technologies linked to the use of the subsoil for the energy transition and the reduction of greenhouse gas emissions such as hydrogen production and storage, carbon capture usage and storage, biogas upgrading and storage, geothermal energy, etc.*
- \* *To train top-level students for careers in academic or private research in geophysics, geology, applied physics, or chemical engineering in the scope of major energy and environmental challenges.*
- \* *To train students to develop cutting-edge experimental and computational skills to deal with complex problems in industry and design offices, from the molecular to the reservoir scale.*

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## Your university

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## Additional information

### Assets

- \* Training in English
- \* More than one-third of credit hours acquired in research
- \* Integrating research laboratories right from the 1st semester
- \* Student-centered learning
- \* Multidisciplinary (Geology, Chemistry, Physics...)

- \* Post-graduate studies with a PhD thesis - if the criteria of excellence are met
- \* Tutorship and tailor-made programs: each student will have a tutor with whom she will build her/his curriculum related to his aspirations and research interests. The tutor will also help the student define a series of face-to-face or e-learning courses (up to 20 or 25% for the Science graduate programs) that s/he can easily keep up with.

### The International Master Programs Admission Office

[master.programs@univ-pau.fr](mailto:master.programs@univ-pau.fr)

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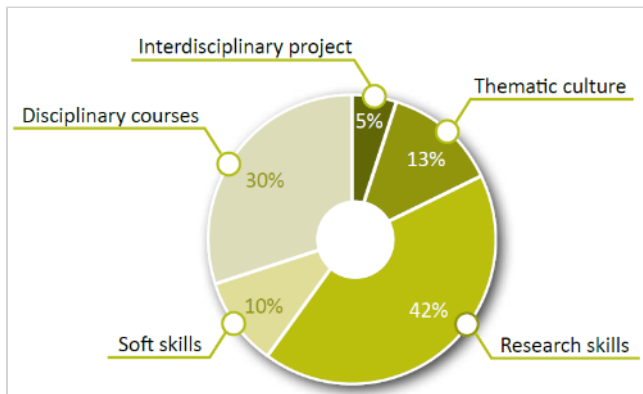
## Organisation

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### Organization

#### Interdisciplinarity and research immersion in laboratories

In order to promote transversal and interdisciplinary activities, all the Graduate Programs (GP) proposed by GREEN are identically structured. In addition to the research training which represents 40% of a Master's credits, the courses offered in each GP are a combination of standard thematic culture courses in the field of Energy and Environment (Sustainability Science, Resilience Alliance, Ecological Economics, and Political Ecology, Health & Ecotoxicology, Energy Law & Policy...) and essential soft skills completed by fundamental and specialized disciplinary courses to fit with the research or topic interest of the students.



SEMESTER 1	ECTS
Geomechanics basics	2
Computing tools	2
Reservoir engineering	2
Transport phenomena	4
Production and storage systems	2
Geodynamics and Reservoirs	4
Monitoring and identification of geological reservoirs	4
Signal processing in Geosciences	4
Numerical methods	4

SEMESTER 2	ECTS
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Scientific computation with Python	2
Scientific computing	4
Porous flow simulations	4
Advanced Geomechanics	2
Reservoir engineering 2	2
Flow simulations for pipes and wells	4
Geological folds and cracks	4
Fluids and Georesources 1	2
Microstructures and Rock deformations	4
Field trip	2

SEMESTER 3	ECTS
Health, Safety and Environment	2
Geological Repository and environmental issues	4
Gaseous renewable energy sources	2



Performance analysis of wells	2
Processes for fluid injections	2
Real-life application cases and simulations for reservoirs	4
Industrial coding	4
Multi-scale modeling	4
Advanced computer tools	2
Real-life application cases and simulations for production	4
Real-life application cases for geosciences	4
Well logging	2
Rocks physics for Geoenery 1	2
Data processing and inversion	4
Fluids and georessources advanced.	2
Characterization of the macroscopic damage of the reservoir system	4
Field trip Reservoir	4
Rocks physics for Geoenery 2	2

Geostatistics	2
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## Trainings

**Internship** : Mandatory

## Admission

### Admission requirements

The GREEN Graduate school is open to high-potential students from a variety of scientific backgrounds who have completed their undergraduate training with the highest honors and are highly motivated for a dedicated research-focused PhD-track program.

Depending on the field of research, applicants must hold a Bachelor's degree in Physics, Chemical Engineering, Mechanical Engineering, Geology or Geophysics.

**Applicants must be fluent in English, both in writing and speaking.**

- \* A non-native English candidate must pass an internationally recognized English test or an English interview with our lecturers.
- \* Minimum required score CECRL **B2** level in English.

### How to apply

Apply here from **October to March**

## And after



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## Professional insertion

### Sector

- \* Environment
- \* Energy

### Fields

- \* Research and Development

### Positions

- \* Academic positions
- \* R&D Engineers

## Useful info

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## Contacts

### Coordinator

Romain Vermorel

✉ [romain.vermorel@univ-pau.fr](mailto:romain.vermorel@univ-pau.fr)

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## Partner laboratories

Laboratoire des Fluides Complexes et leurs  
Réservoirs

🔗 <https://lfc.univ-pau.fr/fr/index.html>

Laboratoire de Mathématiques et de leurs  
Applications de Pau

🔗 <https://lma-umr5142.univ-pau.fr/fr/index.html>

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## Campus

 Pau



# Program

Graduate Program GREEN SAGE Semester 1