

SCIENCES, TECHNOLOGIES AND HEALTH

# Master in Materials science and engineering

Sciences et génie des matériaux



Target level  
Baccalaureate  
+5



ECTS  
120 credits



Duration  
2 years



Component  
Grenoble  
INP - Phelma  
(Physique,  
électronique  
et matériaux),  
UGA, Grenoble  
INP - Pagora  
(Ecole  
internationale  
du papier, de la  
communication  
imprimée et des  
biomatériaux),  
UGA



Language(s) of  
instruction  
English, French

## Subprograms

- > Electrochemical engineering for energy conversion and storage
- > Engineering of functional materials
- > Materials for nuclear energy
- > Biorefinery and biomaterials



## Presentation

**Course co-accredited by the National Polytechnic Institute of Grenoble (Grenoble INP) and Université Grenoble Alpes**

The SGM research master offers a very diverse course, focusing on both structural (for transport, conversion of energy) and functional materials (for microelectronics in particular). The scientific training covers the essential concepts on development, phenomena governing the genesis of microstructures, and behaviour (mechanical, electronic, surfaces etc). Modelling and simulation in

materials science, an important theme in the laboratories associated with the training, is also discussed.

The considerable time given to optional courses means that the programme can be adapted to each student's career plan. The training curriculum contains a series of courses and an internship of at least 5 months providing an introduction to research.

There are employment opportunities in public and private research and in industrial R&D in sectors such as metallurgy, microelectronics, transport, energy conversion and chemistry.

During the 1st year year, students follow a foundation program worth 24 ECTS, which mainly covers the basic tools needed for materials science.

Two standard programs in French are offered for this specialisation. In accordance with site policy, these courses are offered under the dual course in 2nd year to students at Grenoble INP-PHELMA on the Materials science and engineering, and Electrochemistry and processes courses.

As such, many elements of the master are shared with these courses from Grenoble INP-PHELMA. Two international programs are also offered, with classes in English and individual support for students, in two fields: materials for nuclear energy, and functional materials; in both cases these curricula draw on European networks (KICs, Erasmus Mundus).

The SGM specialisation provides courses on the boundary between physics and chemistry in the areas of materials, electrochemistry and the associated processes. The areas covered are essential to industry, which is continually required to respond to new, mainly environmental, challenges (reducing the weight of structural materials, developing new materials for energy production, conversion and storage, packaging and recycling...). This specialisation therefore teaches the methodological and scientific tools graduates will need to take part in research and innovation in these application areas.

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## Skills

- Basic physico-chemical mechanisms involved in materials science

- Classification of materials, properties associated with major families of materials
- Materials development methods
- Materials characterization methods
- Numerical and modeling methods
- Transversal courses

**International education** : Internationally-oriented programmes

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## International dimension

The two programs Engineering of functional materials and Materials for nuclear energy are international courses:

- Materials for nuclear energy : this course welcomes 2nd year students from Barcelona and Stockholm as part of the EMINE master of KIC InnoEnergy
- Engineering of functional materials: this course sends a part of the students to other European universities after the 1st year as part of the FAME Erasmus Mundus master, and welcomes in 2nd year in the same framework students who have done their 1st year in Augsburg (Germany) . This training is also being certified by the KIC RawMaterials

## Organisation

## Admission

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### Access conditions

To be accepted for a master 1st year, you must hold a bachelor degree (licence 3rd year) or equivalent. To be accepted for a master 2nd year, you must hold a master 1 degree or equivalent. Your previous studies must be compatible with the master you wish to study. The recruitment and registration conditions are stated for each speciality.

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### Candidature / Application

See [Grenoble INP website](#)

## And after

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### Further studies

PhD - Science and engineering of materials and associated processes, applications for energy (nuclear, fuel cells, batteries, photovoltaic ...), transport, metallurgy, microelectronics. Doctoral School I-MEP2

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### Sector(s)

- Materials engineering: developers, materials users (transport, energy, ICT, ...)
  - Electrochemistry and processes : sectors of energy (in particular renewable), environment, micro-electronics, durability of materials
  - Materials for nuclear energy : nuclear power sector, power plant supplier, operator
  - Engineering of functional materials : functional material sectors, microelectronics, information technologies, nanomaterials ...
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### Targeted trades

Career opportunities for each standard program : doctorate in engineering sciences, researcher in a public organisation or in industry - study and project engineer

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### Additional information

No specific organization on courses in French

- For courses in English, setting up a personalized follow-up of students (mainly foreigners) : housing assistance, tuition management, tutoring
- For Materials for nuclear energy : part of the courses take place at CEA Cadarache and at the Materials Ageing

Institute of EDF. In addition, this course welcomes 2nd year's students from Barcelona and Stockholm as part of the EMINE master of KIC InnoEnergy

- For Engineering of functional materials: this training sends after the 1st year part of the students in other European universities in the framework of the FAME Erasmus Mundus Master, and welcomes and welcomes in 2nd year in the same frame of the students who carried out their 1st year in Augsburg (Darmstadt (De) and Aalto (Fin)

Training in collaboration with the associated strategic axes of the site (Eco-efficient processes and materials (principal), carbon-low energy (secondary), nanoscience, nanotechnologies and microsystems (secondary) - and Labex and directly associated laboratories (Labex CEMAM (Center of Excellence for Multi-functional Architectural Materials), SIMAP (Materials Science and Engineering and Processes), LEPMI (Laboratory of Electrochemistry and Physico-Chemistry of Materials and Interfaces ), LMGP (Laboratory of Materials and Physical Engineering)

## Useful info

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### Contacts

[Program director](#)

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[Program administration](#)

Scolarité PHELMA

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### Course location(s) - City

📍 Grenoble

## Campus

 Grenoble - University campus

 Grenoble - Scientific Polygon

# Program

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## Specifics of the program

Awaiting update

Electrochemical engineering for energy conversion and storage

Engineering of functional materials

Materials for nuclear energy

Biorefinery and biomaterials