



SCIENCE, TECHNOLOGY, HEALTH

Master's degree Chemistry and Physico-Chemistry of Materials

Master Materials Science and Engineering



ECTS
120 credits



Duration
2 years



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



Language(s)
English

Presentation

Apply here from October to March

Master of Science (MSc) **CPCM** "Chemistry and Physico-Chemistry of Materials" provides a complete education program in the field of materials, by addressing all aspects related to their synthesis/elaboration, their fine characterization, and their implementation for specific applications.

In the title of this master's program, the term "Chemistry" refers to synthesis and elaboration aspects, while the term "Physico-Chemistry" refers to characterization science and understanding of mechanisms and phenomena taking place at different scales of the material (micro/nano or surface/bulk).

The training delivered by Master CPCM allows you to find rapidly a job in the industry as a senior executive, in all sectors of activity using or designing materials, as soon as you have obtained the Master's degree. Alternatively, you can continue your training with a Ph.D. thesis (three years), which is an advantage in several fields of research and development.

Master **CPCM** relies on recognized senior researchers, professors, and assistant professors, in the field of chemistry and physics, carrying out their research activity at IPREM Institute (Institute of Analytical Sciences and Physico-Chemistry for Environment and Materials) <https://iprem.univ-pau.fr/en/institute.html>, more precisely in the following scientific departments (clusters): PCM " Physico-chemistry of surfaces and polymer materials" and CAPT " Analytical, Physical and Theoretical Chemistry". The teaching program, comprising lectures, supervised and practical work, and case studies, is taught by university lecturers and researchers, and by personnel from the socio-professional sector. Internships can be performed in companies or in academic research laboratories (in this case they are generally done in IPREM, but internships can also be done in other labs in France or abroad).

The MSc degree meets the industrial requirements in terms of skills and know-how in the field of materials and integrates a reflection on sustainable development and implementation of new materials able to meet the new requirements and challenges in terms of energy management and respect for the environment.

Objectives



- * Train the students to an advanced specialized level for present and future challenges in materials chemistry, energy, polymers, and modeling
- * Develop their engineering and research skills
- * Prepare students for leading positions in industry and public institutions.

Your university

Skills

At the end of this program, the students of the "**Chemistry and Physico-Chemistry of Materials**" master's degree will be able to:

- * Elaborate materials (organic and inorganic),
- * Use various analytical techniques to characterize materials,
- * Validate, interpret, and model experimental results,
- * Produce quality research,
- * Carry out a research project.
- * Summarize their work (experimental plan, results, and interpretation) in a report and communicate appropriately with experts.

Additional information

Scholarships

- * Eiffel Scholarship of Excellence
- * Talents' Academy Grants | 
- * Catalogue des Bourses Campus France | 

The International Master Programs Admission Office











master.programs@univ-pau.fr

Organisation

Organization

Training content

Practical training is carried out in the chemistry lab of the university, and in the different research rooms of the Institute of Analytical Sciences and Physico-Chemistry for Environment and Materials (IPREM), hosting cutting-edge scientific equipment.

Mandatory (24 ECTS)
Different kinds of materials and their properties 
Elaboration of materials: <ul style="list-style-type: none"> * Organic polymers  * Inorganic materials 
Environmentally sustainable chemistry: <ul style="list-style-type: none"> * Environmentally friendly design of materials  * Green chemistry 
Polymer science in the lab 
Magnetic properties of materials 
Modeling 
Coupling experience and theory 
Characterization methods 1 : X-ray diffraction 
English or French as a foreign language
ELECTIVES (6 ECTS)



Composite materials 1: * Introduction to composite materials 📄 * Mechanical properties of composite materials 1 📄	Composite materials 2 Thermoset matrices 📄 Materials and HQE certification 📄 Material Corrosion 📄
Business environment (project management/intellectual property) 📄	Inorganic materials: * Metals and alloys (2 ECTS) 📄 * Ceramics (2 ECTS) 📄
Analytical Chemistry 📄	
Heteroelements, metal-organic chemistry, and synthesis strategies 📄	Materials with remarkable properties (additional, no associated ECTS) 📄
Statistical thermodynamics (additional, no associated ECTS) 📄	Theoretical Spectroscopy (additional, no associated ECTS) 📄
Computer programming (additional, no associated ECTS) 📄	
1st YEAR: 2nd SEMESTER	
Mandatory (25 ECTS)	
Physical chemistry of macromolecular solutions 📄	Mandatory (22 ECTS)
Academic and industrial internship: * Industrial internship (1 ECTS) 📄 * Introduction to Research (4 ECTS) 📄	Materials for energy storage and conversion 📄 New materials 📄 Surface chemistry and interfaces 📄
Materials chemistry in the lab 📄	Multi-scale description of complex systems
Characterization methods 2: * NMR (2 ECTS) 📄 * Electronic and vibrational spectroscopies (2 ECTS) 📄 * Microscopies (2 ECTS) 📄	Optical properties of materials 📄 English or French as a foreign language
Electronic properties of materials 📄	Optional (8 ECTS)
Elaboration of materials 2: * Polymer chemistry (2 ECTS) 📄 * Sol-gel chemistry (2 ECTS) 📄	Methods and techniques for polymer-based materials synthesis 📄 Nanomaterials: from the laboratory to the application 📄 Polymers and the environment: Natural polymers - Biomass valorization 📄
English or French as a foreign language	Adhesion & Adhesives 📄
Electives (5 ECTS)	Theoretical Chemistry and Spectroscopies (RCTF) 📄



Theoretical Chemistry applied to the study of materials (RCTF) 🏠	* Applicants must hold at least a Bachelor's degree for the Master 1 level.
Polymers for living systems: Introduction to biological soft matter 🏠	* Applicants must hold at least a 4-year university level for the Master 2 level
Imaging techniques for environmental samples and materials 🏠	English Language Requirements
Industrial copolymers	Applicants must be fluent in English, both in writing and speaking. An applicant whose native language is not English has to take a recognized international English test.
Nanocomposites	
Nanomaterials	Minimum required score: CECRL B2 🏠 level in English
Numerical methods	
Quantum reactivity	How to apply
	Apply here from October to March 2 nd YEAR. 4 th SEMESTER
Mandatory (30 ECTS) – Academic (6 + 24) or industrial (30) path	Tuition Fees and partial exemptions
Introduction to laboratory research (6 weeks)	
Research Internship in an academic lab (4 months) 🏠	
Internship in the industry (6 months) 🏠	Administrative tuition in France is determined at a national level. The French Ministerial Order of April 19, 2019, amended on June 9, 2020, sets university tuition for a Master's Program as follows: European nationals: €243 , extra-European nationals: €3770 .

Trainings

Intership : Mandatory

Intership duration : 2-3 months for the 1st year / 4-6 months for the 2nd year

Admission

Admission requirements

Academic Requirements

For the academic year 2022-2023, the Board of Directors has extended its policy of automatically providing a **partial reduction of these fees at the UPPA**. As a result, extra-European nationals will be granted automatic partial reductions such that **they will be able to pay the same enrollment fees as European nationals**.

Extra fees:

In addition to academic tuition, most students must pay a student body fee (CVEC, which cost €92 in 2020-2021).

NB: Admitted candidates in any course of study who have taken a break of more than two years from their studies will enroll via



*the UPPA's **Continuing Education service** (Formation Continue / FORCO). They are exempt from the CVEC, however, they may be subject to a different tuition scale.*

- * A senior manager responsible for quality operations or even production management
- * Technical Director (R & D)
- * Teacher-researcher (possible at the end of a doctorate.)

Student capacity

30 students: 15 in M1 and 15 in M2

And after

Professional insertion

Prospects for employment or further study

Sectors

- * Chemistry
- * Energy (photovoltaics, batteries, fuel cells, artificial photosynthesis ..)
- * Environment (non-polluting materials, pollution control materials, and storage...)
- * Transport (composite materials, surface treatments ...)
- * Building (thermal and sound insulating coatings ...)
- * Cosmetics & life science

Fields

- * Research and Development

Positions

- * Research and Innovation Engineer, Ph.D. students
- * Project Manager
- * A senior manager in design and development (design engineer)
- * A senior manager in production (process engineer, production engineer)

Useful info

Contacts

Head of Studies

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Partner laboratories

IPREM

🔗 <https://iprem.univ-pau.fr/>

Place

📍 Pau

Campus

🏠 Pau