

# MASTER CHEMISTRY AND LIFE SCIENCES

## IN BRIEF

**Type of diploma :** Master degree

**Ministry field(s) :** Science and Technology

## PRESENTATION

## MORE INFO

Environmental protection and sustainable development have become societal major issues. It is now also acknowledged that we must take advantage of our expertise in physico-chemistry and microbiology to identify, assess and manage the anthropogenic contamination of air, water, soils and waste. This program trains multidisciplinary managers who will be able to offer and implement solutions to solve environmental problems.

The Chemistry and Life Sciences program aims at training specialists able to analyze, manage and process environmental issues. The program offers common core courses which train students in both Chemistry and Life sciences as related to the environment.

The Chemistry and Life Sciences program trains managers in the field of environment. Job prospects are the following:

- \* Research engineer
- \* Environmental engineer
- \* Research and Innovation engineer

The Chemistry and Life Sciences *is a 2-years course. It offers 4 "tracks/paths".* All courses of the second year of the "track/path" CMCEI and BME (or MBEM) are taught in English. The "track/path" CMCEI is opened only for the second year.

## ORGANIZATION

- M2 Chemical and microbiological characterization for environmental issues (Master degree in microbiology, molecular biology and analytical chemistry for the environment)
- M2 Molecular Biology and Environmental Microbiology

## ORGANIZATIONAL UNIT

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

**PLACES**

Pau

**PERSON IN CHARGE**

# M2 Chemical and microbiological characterization for environmental issues (Master degree in microbiology, molecular biology and analytical chemistry for the environment)

## PRESENTATION

### MORE INFO

Internship : (6 months)



APPLICATIONS  
ARE  
OPEN



APPLY  
NOW!

Strongly increasing societal demand in the fields of Environment, Sustainable Development and Health, implies a synergy of advanced skills in Chemistry and Biology Sciences. In order to be able to effectively respond to this demand and to implement innovative solutions providing efficient answers to these requests, it is essential to perfectly understand the interaction of contaminants with living organisms and particularly their structures, properties, reactivities/activities in natural ecosystems. The “Chemical and Microbiological Characterization for Environmental Issues” (CMCEI) second year course of the Master in Chemistry and Life Sciences aims to train specialists with knowledge in the most recent advances in analytical chemistry, physico-chemistry, molecular biology and environmental microbiology.

## OBJECTIVES

Entirely taught in English, the first semester is devoted to the knowledge of contaminants cycles and to the application of different techniques for the analysis of chemical elements and species of interest in various compartments of environment, the identification of microorganisms presenting a risk for the

environment or public health, but also quality assurance, critical evaluation of scientific publications and /or technical documentation.

The second semester consists of a six-month research internship in the field of chemical and/or biological analysis applied to the environment in IPREM teams.

The course is mainly taught through project-based scenarios. This helps students understand scientific approach in research. It also makes them put into practice various techniques and reflect further on their professional project.

## SKILLS

At the end of this program, the students in the «**Chemical and Microbiological Characterization for Environmental Issues Master**» will be able to:

- \* Show expertise in modern techniques in chemistry, molecular biology and microbiology
- \* Synthesize technical and research documentations to produce a technical study
- \* Plan and define a research or R&D project in analytical chemistry, molecular biology, microbiology or environmental survey
- \* Manage and carry out a project
- \* Manage field experiments to estimate the efficiency of chemical or biological methods for the protection of the ecosystems
- \* Interpret and validate results of chemical and biological analysis
- \* Produce summary report describing the experiments done, the applied methods used and the results obtained

## ADDITIONAL INFORMATION

- \* Region Aquitaine Scholarships for non-EU students
- \* [EIFFEL Scholarship of Excellence](#)
- \* [E2S Talents' Academy Scholarships for all students](#)
- \* Specific Master's scholarship

## TRAINING CONTENT

<b>SEMESTER 1</b>	<b>ECTS</b>
<b>Trace elements in the environment</b>	
Trace elements biogeochemical cycles	<b>2</b>
Speciation concepts and analysis	<b>2</b>
<b>Advanced analytical chemistry</b>	
Advanced separation techniques	<b>2</b>
Advanced spectrometric techniques coupling	<b>2</b>
Electrochemical sensors	<b>2</b>
Biological macromolecules characterization	<b>2</b>
Organic contaminants analysis	<b>2</b>
Imaging techniques for environmental samples and materials characterization	<b>2</b>
<b>Statistical tools, chemometrics and quality</b>	
Analytical methods performances evaluation	<b>2</b>
Quality assurance for analysis	<b>2</b>
Statistical tools project	<b>4</b>
<b>Microbiology and molecular biology for Environmental applications</b>	
Microbial biotransformations and	<b>4</b>

environmental applications: project	
Microbial biotransformations and environmental applications : conferences	<b>2</b>
Molecular biology, Technological applications	<b>6</b>
<b>Research tools and applications</b>	
Scientific papers and documentation critical evaluation	<b>2</b>
Environmental Project	<b>4</b>
<b>Language</b>	
French as a Foreign language	<b>2</b>
<b>SEMESTER 2</b>	
<b>Internship in an academic or industrial research project</b>	<b>30</b>

### ACCESS CONDITIONS

Applicants must hold at least a 4-year university level in chemistry and/or biology fields.

The **M2 CMCEI** is open to students who have completed an M1 (4-year degree) in "**Chemistry and Life sciences**" (SAVE), "**Molecular Biology and micro-biology for the environment**" (BME) or an equivalent level.

For students outside the UPPA, integration in the second year is subjected to a selection on curricula with equivalent training level and with sufficient skills in biology, chemistry and environment (Molecular biology, bioinformatics, microbiology, environmental microbiology, ecotoxicology, biostatistics, field

sampling and data processing, physico-chemistry, analytical chemistry, environment).

## English Language requirements

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.

**Minimum required score:** **CECRL B2** level in English

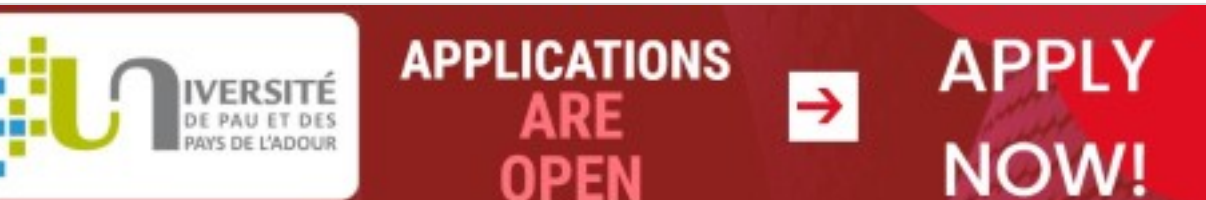
## French Language Requirements

**None:** French language courses are included in the formation.

**For any additional information or questions related to application, please contact:**

✉ [florence.pannier@univ-pau.fr](mailto:florence.pannier@univ-pau.fr)  
or [christine.cagnon@univ-pau.fr](mailto:christine.cagnon@univ-pau.fr)

### INSCRIPTION MODALITIES



### EXPENSES

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 Program as follows: European nationals: **€243**, extra-European nationals: **€3770**.

For academic year 2021-2022, the Board of Directors has extended its policy of automatically providing **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.*

## PROFESSIONAL INSERTION

## Sectors:

- \* Environment
- \* Agribusiness
- \* Analytical chemistry
- \* Chemical industries
- \* Biotechnology

## Fields:

- \* Research and Development, quality control

## Positions:

- \* Academic positions
- \* Researchers (public institutes or private companies)
- \* Research and Innovation Engineers
- \* PhD students

## ORGANIZATIONAL UNIT

Etablissement

## PLACES

Pau

## PERSON IN CHARGE

PANNIER Florence  
florence.pannier@univ-pau.fr



Responsable Master BME CAGNON Christine  
christine.cagnon@univ-pau.fr

# M2 Molecular Biology and Environmental Microbiology

PRESENTATION

MORE INFO

Number of students : 15



APPLICATIONS  
ARE  
OPEN



APPLY  
NOW

PARTNER LABORATORIES

IPREM



Increasingly strong societal demand in the fields of the Environment, sustainable development and health now calls for a synergy of cutting-edge skills involving Chemical and Biological Sciences.

The Master's degree in **Molecular biology and Environmental Microbiology** trains specialists with a mastery of modern **molecular** biology and **environmental microbiology**, with a solid background in **chemistry**, capable of grasping environmental issues related to:

- \* The protection of **ecosystems**,
- \* The ecotoxicology of soils, sediments and water,
- \* The identification of microorganisms representing a risk to the environment or public health,
- \* The bio-rehabilitation of sites affected by anthropogenic (industrial and agricultural) pollution.

The **Molecular Biology and Environmental Microbiology**

Master's degree is at the heart of this technological and socio-economic evolution. At a meeting point between the professional world and the University in a region that is home to large-scale facilities of several industrial companies concerned by bio-depollution (Total, Arkema, chemical industries at the [Lacq site](#)) and a strong agricultural activity.

Biological methods developed for the remediation of contaminated sites, the treatment of effluents, the control of the use of phytosanitary products or the search for pathogens in natural waters and cooling or water distribution systems are increasingly in demand and proposed as necessary alternatives for the sustainable improvement of environmental problems.

The implementation of these methods as well as the development of molecular analysis tools and techniques (quantitative PCR, DNA chips, high-throughput sequencing, bioinformatics analysis, microbial biosensors, GMOs, protein engineering) is one of the challenges for industrial and environmental policies in the coming years.

An orientation towards research may be envisaged, depending on the choice of options and especially internships.

## OBJECTIVES

Taught in English, the first semester is devoted to theoretical and practical teaching by teacher-researchers, supplemented by conferences in which professionals from the sector share their experience on the field, as well as visits to companies. The course is mainly taught through project-based scenarios.

The second semester consists of an internship of 4 to 6 months in a company, a professional organization or an academic research laboratory.

## SKILLS

**At the end of this course, graduates will develop the following skills according to their choice of optional courses:**

- Identify the concepts and approaches of modern microbiology and biology,
- Understand the complexity and importance of microbial processes in the environment,
- Master modern biochemical, molecular and genetic methodologies, as well as mathematical, statistical and computer bioinformatic tools,
- Search for pathogens in natural environments and industrial installations or select micro-organisms likely to degrade contaminants of biotic or abiotic origin in the laboratory or in the natural environment,

- Conduct experiments to evaluate the effectiveness of biological or chemical methods of environmental remediation,
- Conduct studies and formulate opinions to solve practical problems posed by the protection of ecosystems: assessing the benefit-risk of the methods used, setting up field study protocols,
- Conduct field experiments to evaluate the effectiveness of chemical or biological methods for the protection of eco- and agrosystems.

### ADDITIONAL INFORMATION

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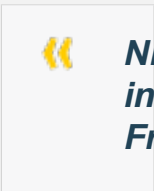
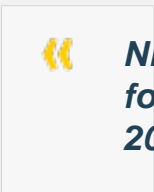
### TRAINING CONTENT

#### SEMESTER 1 from September to January

#### Mandatory courses

Field	Course	ECTS
Language	English or French as a Foreign Language	2
Data analysis	Statistical tools-project	4
Molecular biology and environmental microbiology	Molecular Biology Technological applications (EC3) (6.0 crédits ECTS)  Microbial biotransformations	6 2 4

	<p>and environmental applications - conferences (EC1) (2.0 crédits ECTS)</p> <p>Microbial biotransformations and environmental applications - project (EC2) (4.0 crédits ECTS)</p>	
	<b>Electives: choose for 10 ECTS</b>	<b>ECTS</b>
Quality	Quality assurance for analysis	2
Environmental Chemistry	<ul style="list-style-type: none"> <li>* Trace element biogeochemical cycles 2</li> <li>* Speciation concepts and analysis 2</li> <li>* Biological Macromolecules Characterization 2</li> <li>* Imaging techniques for environmental samples and materials characterization</li> </ul>	

Ecology	Molecular Ecology (2.0 crédits ECTS)	2
Biotechnology	Champignons et biotechnologie (2.0 crédits ECTS) 	2
Water	Water treatment : Lab work on Biological water treatments (EC3) (2.0 crédits ECTS)	2
Health	Environment Health Safety (2.0 crédits ECTS) 	2
Group project	Environmental engineering project	4

### SEMESTER 2 From January to June

Fields	Course title	ECTS
Internship	- Internship	20

Bibliography	- Bibliographic research	10
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## CONTROL KNOWLEDGE

- \* Final exams
- \* Ongoing assessments
- \* Oral presentations

## ACCESS CONDITIONS

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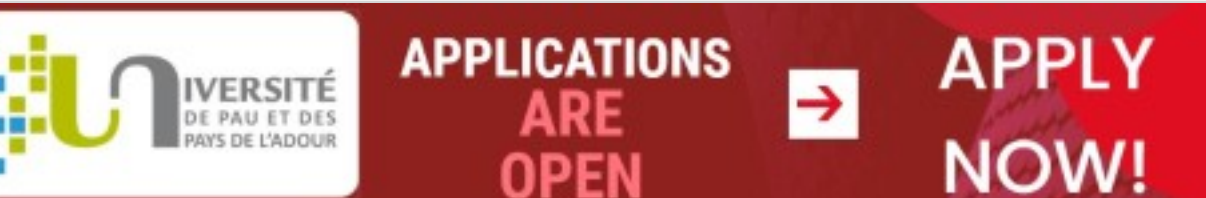
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beatrice.lauga@univ-pau.fr

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## ORGANIZATIONAL UNIT

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

## PLACES



Pau

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