

Share



Email destinataire :

Vous devez renseigner un email valide

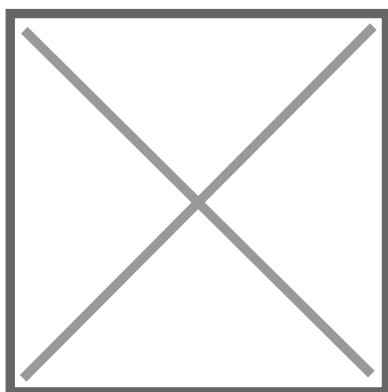
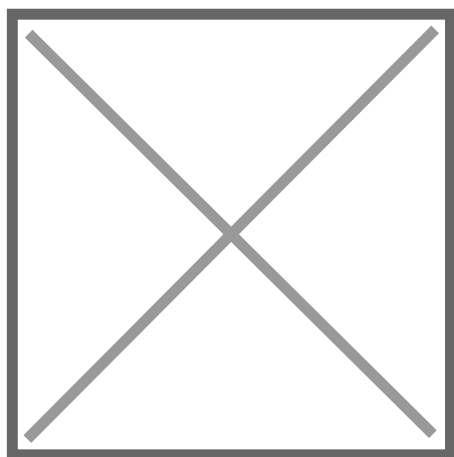
Envoyer

Une erreur est survenue. Merci de réessayer ultérieurement

Le mail de partage a bien été envoyé.

Add to Compare

M1 Chemistry - International Track - ERASMUS Mundus



Master's degree

Specialisation Chemistry

Language(s) of instruction

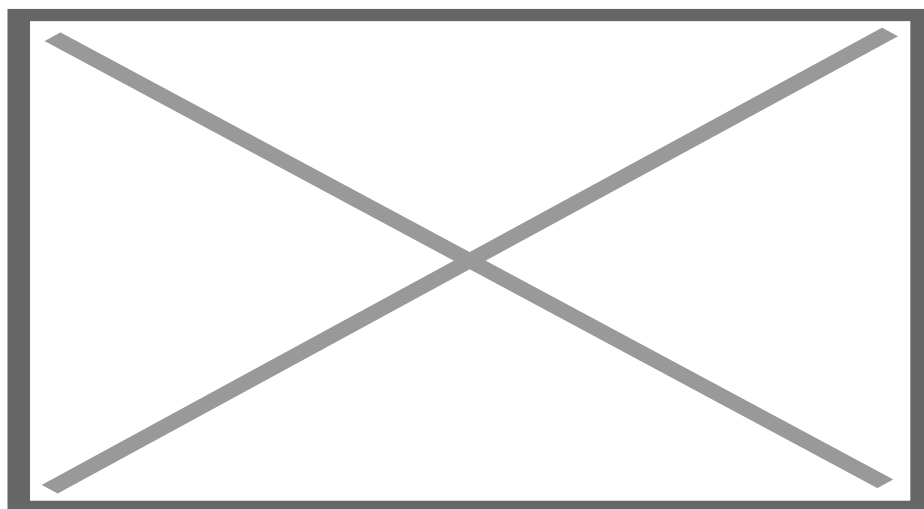
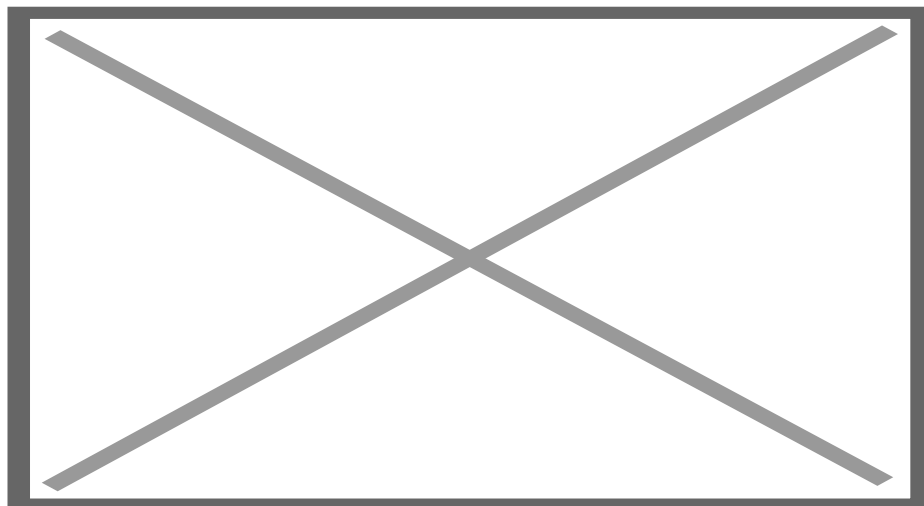
English

A two-year Master's programme in Surface chemistry, electrochemistry, radiation chemistry and photochemistry. The joint Erasmus Mundus SERP Master's programme aims to train experts in experimental and theoretical chemistry, physical chemistry and materials science, high-level management and entrepreneurship.

This course corresponds to the European SERP (Surface, Electro, Radiation and Photo-chemistry) Master's programme, which has been awarded the Erasmus Mundus label by the European Commission + The SERP Master's programme is taught entirely in English and is organised jointly with McGill (Canada), Genoa (Italy), Porto (Portugal) and Adam-Mickiewicz de Poznan (Poland) universities. The Master's programme is open to all French and international students with a wide range of backgrounds. It covers different majors depending on the chosen mobility track, and emphasises learning through research and practice, with a lot of practical work. A winter school is organised on AI and data science, while a summer school is organised on acquiring the methods needed to understand and integrate AI into the professional world of research and industry. Scholarships and mobility grants are available.

[Télécharger la fiche détaillée](#)

[Apply Now](#)





■ ■

Information

- [Overview](#)
- [Application requirements](#)
- [Schedule](#)

Présentation

Skills

- Communicate information and results to a variety of target audiences, being able to describe a protocol and organise results. - Develop and implement a scientific approach in chemistry, whether theoretical or experimental, independently, and organising work time to achieve the set objectives. - Identify and implement methods and techniques for developing and/or producing compounds or materials, in compliance with good laboratory practice. - Select and implement methods for separating and characterising compounds, having mastered the theoretical principles of measurement and being able to interpret results. - Predict physico-chemical properties or the reactivity of compounds and/or materials by combining all disciplinary knowledge. - Understand the properties of the spatial organisation of matter and the temporal aspects of chemical phenomena.

Objectives

With compulsory study mobility in at least two universities, the Erasmus Mundus Masters programme enables students from all over the world to graduate with a double or multiple degree. This curriculum also encourages intercultural experiences, and helps develop students' competencies.

Débouchés

Further Study Opportunities

R&D researcher or data modelling and analysis expert in leading-edge companies or laboratories.

Data Scientist, Data Analyst, Ingénieur·e en Machine Learning dans des secteurs innovants (tech, finance, santé, énergie, etc.) ;

PhD

PhD in Chemistry / Biology

Students in this track can turn to research at the end of the 2nd year Master's.

PhD thesis

Calendar

Start of programme (indicative date)

02/09/2026

End of programme (indicative date)

31/08/2027

Admission

Admission Route

Chemistry

Physics, Chemistry

Capacity

Available Places

10

Target Audience and Entry Requirements

Bachelor of Science

Supporting documents

Compulsory supporting documents

Copy of the last diploma.

Copy of passport.

Motivation letter.

All transcripts of the years / semesters validated since the high school diploma at the date of application.

Certificate of English level.

Curriculum Vitae.

Recommendation letters.

Additional supporting documents

Certificate of English level (compulsory for non-English speakers).

VAP file (obligatory for all persons requesting a valuation of the assets to enter the diploma).

Supporting documents :

- Residence permit stating the country of residence of the first country
- Or receipt of request stating the country of first asylum
- Or document from the UNHCR granting refugee status
- Or receipt of refugee status request delivered in France
- Or residence permit stating the refugee status delivered in France
- Or document stating subsidiary protection in France or abroad
- Or document stating temporary protection in France or abroad.

Programme

Bloc 1 tronc commun

Subjects	ECTS	Semester	Lecture	directed study	practical class	Lecture/directed study	Lecture/practical class	directed study/practical class
<u>Transferable skills</u>	3	Semestre 1	0	24				

Subjects	ECTS	Semester	Lecture	directed study	practical class	Lecture/directed study	Lecture/practical class	directed study/practical class
----------	------	----------	---------	----------------	-----------------	------------------------	-------------------------	--------------------------------

■

Transferable skills

ECTS : 3

Semester: Semestre 1

Detail

Lecture: 0

Directed study: 24

Language(s) of instruction

Français

Remote teaching

non

Prerequisites

none

Programme/contents

Content

French courses: Developing the four language skills in order to be able to communicate with the French: oral and written understanding and oral and written expressions; practical aspects of language in the multimedia room semi self-guided.

Learning objectives

Aims

Language Course: The student will acquire the basic knowledge in the national language and a glimpse at national culture and heritage of the hosting country.

Type of assessment

Evaluation Continue non Intégrale

Quantum mechanics	5	Semestre 1	8	13	14
-----------------------------------	---	------------	---	----	----

Subjects	ECTS	Semester	Lecture	directed study	practical class	Lecture/directed study	Lecture/practical class	directed study/practical class
----------	------	----------	---------	----------------	-----------------	------------------------	-------------------------	--------------------------------

■

Quantum mechanics

ECTS : 5

Semester: Semestre 1

Detail

Lecture: 8

Practical study : 14

Directed study: 13

Language(s) of instruction

Anglais

Remote teaching

non

Prerequisites

Elementary Linear Algebra, and Undergraduate

Physical Chemistry

Programme/contents

Content

Chapter 1: Fundamental concepts

- Domain of quantum mechanics : “microscopic word”
- Properties of electromagnetic waves
- Wave-particle duality : de Broglie’s wave for a free particle
- Double slit experiment
- Wave function,
- Time dependent and time independent Schrödinger equations
- Superposition of states
- Postulates of quantum mechanics

Chapter 2: Quantization

- Quantization in an infinite well (1D, 2D and 3D)
- Tunnelling effects
- Finite 1D well
- Double well

Chapter 3: Molecular vibrations

- Born-Oppenheimer approximation
- Separation of the center of mass in a two-body problem
- Harmonic oscillators
- Vibration of a diatomic molecules
- Vibrational normal modes
- Franck-Condon principle

Subjects	ECTS	Semester	Lecture	directed study	practical class	Lecture/directed study	Lecture/practical class	directed study/practical class
Organic / Inorganic chemistry towards sustainability	5	Semestre 1	9	15	8			



Organic / Inorganic chemistry towards sustainability

ECTS : 5

Semester: Semestre 1

Detail

Lecture: 9

Practical study : 8

Directed study: 15

Independent learning: 10

Language(s) of instruction

Anglais

Remote teaching

non

Prerequisites

Atomistics.

Knowledge on the fundamental reactions on the following topics:

Alkanes, Alkenes, Alkynes and aromatics,

Halogenated compounds, alcohols, aldehydes and ketones

Programme/contents

Content

- **Part I:** inorganic chemistry: Definition of metal complexes, d orbitals description, crystal field theory, Molecular orbitals theory, Angular Overlap Model. Important parameters affecting the d block. Basics on reactivity.
- **Part II:** organic chemistry: Structure and reactivity of aromatic compounds, Reactivities of carbonyls, carboxyls, amines and phosphorus compounds.

Learning objectives

Aims

Transition metal complexes are at the heart of all biological processes that support life and are crucial in the development of new technologies for a sustainable world. Research in this field spans from synthesis, spectroscopic characterization, electronic description, surface science, electrochemical and photochemical processes. This course aims at providing the students with a solid basis in coordination chemistry and related areas with the

Subjects	ECTS	Semester	Lecture	directed study	practical class	Lecture/directed study	Lecture/practical class	directed study/practical class
Kinetics / Electrochemistry	5	Semestre 1	16	12	16			

Subjects	ECTS	Semester	Lecture	directed study	practical class	Lecture/directed study	Lecture/practical class	directed study/practical class
----------	------	----------	---------	----------------	-----------------	------------------------	-------------------------	--------------------------------

■

Kinetics / Electrochemistry

ECTS : 5

Semester: Semestre 1

Detail

Lecture: 16

Practical study : 16

Directed study: 12

Language(s) of instruction

Anglais

Remote teaching

non

Prerequisites

Fundamentals of Kinetics (reaction order, rate constant, Arrhenius law,...)

Solution Chemistry (acid-base, redox, precipitation, complexation,...)

Basics of Chemical Thermodynamics (enthalpy, entropy, Gibbs free energy, equilibrium constant,...)

Programme/contents

Reaction kinetics

- Relation between rates and mechanisms of chemical reactions
- Collision theory of reaction rates
- Activated complex theory
- Reactions in solution
- Introduction to photochemistry

- Redox reactions and Electrochemistry

- Fundamentals of electron transfer
- Cyclic and linear sweep voltammetry
- Thermodynamics and kinetics of electron transfer
- Electron transfer in biological systems

Laboratory training

- Laser Induced Fluorescence of I₂ gas
- Study of molecules by Flash photolysis method
- Influence of the ionic strength on the solubility of a salt
- Cyclic voltammetry of a reversible system
- Mediated redox enzyme electrochemistry

Learning objectives

Reaction kinetics in chemical reactions, equilibrium

Subjects	ECTS	Semester	Lecture	directed study	practical class	Lecture/directed study	Lecture/practical class	directed study/practical class
Introduction to biophysics and microscopies for life sciences	5	Semestre 1	12	11	10			



Introduction to biophysics and microscopies for life sciences

ECTS : 5

Semester: Semestre 1

Detail

Lecture: 12

Practical study : 10

Directed study: 11

Language(s) of instruction

Anglais

Remote teaching

non

Prerequisites

None

Programme/contents

Biophysics and microscopies for the life sciences

- Optical microscopy: Fluorescence and fluorescent probes for biology, setups for microscopy, super-resolved microscopy techniques, applications to quantitative analysis of molecular behaviors in live cells
- Introduction to Atomic Force Microscopy: Atomic Force Microscopy (AFM): Theory and application of AFM. From cells to single molecule studies (Living cells imaging, DNA imaging, biopolymer elasticity).

Learning objectives

This course is an introduction to several concepts of Biophysics organized by a multidisciplinary team composed of physico-chemist, physicists and cell biologists. It will focus on microscopies and their application to biology.

Overall organisation

Theoretical courses, tutorials and practicals

Practical courses

- Visualization of cell's cytoskeleton: The aim of the course is to use the immunofluorescence technique to stain components of the cell (actin filaments, tubulins and microtubules) on fixed cells.
- Bioinformatics: The aim of this course is to

Subjects	ECTS	Semester	Lecture	directed study	practical class	Lecture/directed study	Lecture/practical class	directed study/practical class
Experimental methods on Innovative research Infrastructures (IR and UV-Vis spectroscopies, NMR, MS)	5	Semestre 1	18	12	16			

Experimental methods on Innovative research Infrastructures (IR and UV-Vis spectroscopies, NMR, MS)

ECTS : 5

Semester: Semestre 1

Detail

Lecture: 18

Practical study : 16

Directed study: 12

Language(s) of instruction

Anglais

Remote teaching

non

Prerequisites

Basics on quantum mechanics (hamiltonien, states of a system)

Basics on classical mechanics (motion of solid bodies)

Description of a photon (as a particle, as an electromagnetic wave)

Programme/contents

This teaching unit deals with 4 of the main standard spectroscopic techniques: Mass spectrometry, IR and UV spectroscopies and NMR. Mass Spectrometry: Introduction to Mass spectrometry and instrument components (gas phase ion source and mass analyzers).

Interpretation of electron impact fragmentation mass spectra of organic molecules.

Structural and sequence information obtained from tandem mass spectrometry.

Optical spectroscopies & Photophysical processes

When molecules and light meet

Electronic transitions – UV-visible and fluorescence

Rovibrational spectroscopy – IR spectroscopy.

NMR: Nuclear Magnetic Resonance (NMR)

spectroscopy. Introduction and presentation of the concepts allowing for molecular structure

determination, for composition analysis of mixtures,

access to dynamics selected systems, applications to

the life science area, and development on NMR

equipment.

Learning objectives

Subjects	ECTS	Semester	Lecture	directed study	practical class	Lecture/directed study	Lecture/practical class	directed study/practical class
Winter School	2	Semestre 1	6	16.5				
■								

Winter School

ECTS : 2

Semester: Semestre 1

Detail

Lecture: 6

Directed study: 16.5

Language(s) of instruction

Anglais

Remote teaching

non

Programme/contents

Content

One-week winter school organized at the end of the first semester at U.Porto and AMU (rotating locations).

In this school, students will get an introduction to different aspects of computational data science as it can be applied to chemical and material sciences.

Guest researchers from both the academic and non-academic sectors working in the domain of Artificial Intelligence will also present their current research.

Mathematical algorithms for data treatments, computational approaches, and programming methods and tools (i.e. Python, hand machine/deep learning techniques) will be introduced and applied to several problems to solve, such as searching for new molecules, medicines, and materials more eco-friendly and more sustainable, and prediction of properties of complex substances that have yet to be synthesized.

Type of assessment

Evaluation Continue non Intégrale

[Digital Micro-Certification](#)

["The Challenges of Sustainable Chemistry"](#)

0 Semestre 1 10.5

Digital Micro-Certification "The Challenges of Sustainable Chemistry"

ECTS : 0

Semester: Semestre 1

Detail

Lecture: 10.5

Language(s) of instruction

Anglais

Remote teaching

non

Programme/contents

Introduction to sustainable development

Life Cycle Assessment (LCA) - eco-design

Chemical waste management/recycling and the circular economy

Renewable and bio-based chemistry

Environmental regulations/standards in chemistry

Environmental performance assessment/certification

Learning objectives

- Educate yourself on the concepts of sustainable development
- Identify the major environmental regulatory regimes
- Highlight the role of chemistry: its contributions, challenges, and potential for action
- Develop critical thinking on environmental and societal issues

Overall organisation

6 video modules in French with English subtitles to watch online, followed by a test to obtain certification in the form of a digital badge.

Skills

Identify key sustainable development issues to learn about responsible practices

Type of assessment

Evaluation Continue non Intégrale

Bloc 2 Mobility (Poznan ou Porto)

Subjects	ECTS	Semester	Lecture directed study	practical class	Lecture/directed study	Lecture/practical class	directed study/practical class	discovery/practical class
Semestre 2 à l'étranger : Uniwersytet im. Adama Mickiewicza (Pologne) ou Universidade do Porto (Portugal)	30	Semestre 2						
■								

Semestre 2 à l'étranger : Uniwersytet im. Adama Mickiewicza (Pologne) ou Universidade do Porto (Portugal)

ECTS : 30

Semester: Semestre 2

Language(s) of instruction

Français

Remote teaching

non

Type of assessment

Evaluation Continue non Intégrale

Teaching Location(s)

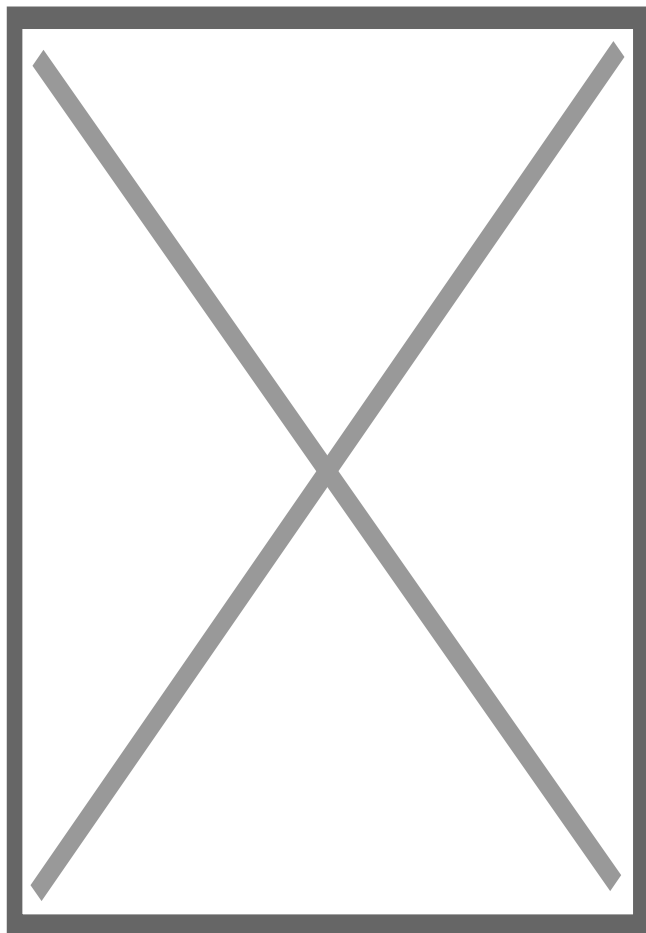
ORSAY

Academic Partner(s)

Universités de McGill (Canada), Gênes (Italie), Porto (Portugal) et Adam Mickiewicz de Poznan (Pologne).

Training campus

Javascript est requis pour visualiser cette carte.



Orsay Bures

Orsay / Bures-sur-Yvette

Bus 4607, 4626

RER B Orsay ville ou Bures-sur-Yvette

[Voir](#)

Library

Community center

Contact

-

Debora Scuderi

Enseignant-Chercheur, UFR Sciences, Université Paris-Saclay

-

Eva RENOUF

Menager

-

SERP Master

Europerean magager

<http://www.universite-paris-saclay.fr/formation/master/chimie/m1-chemistry-international-track-erasmus-mundus>