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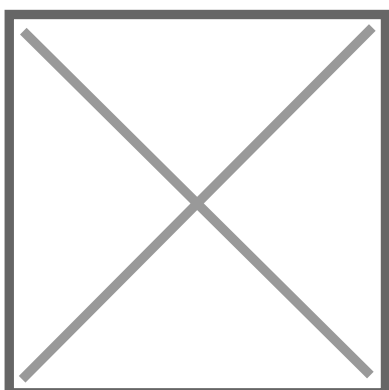
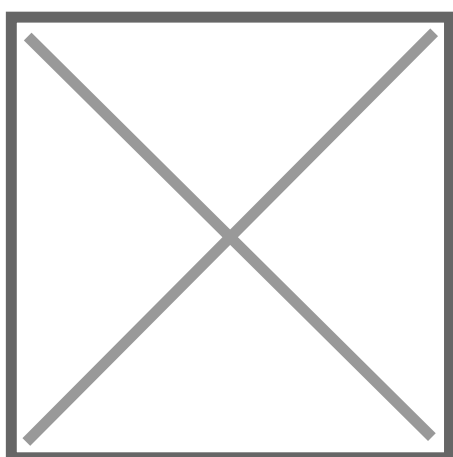
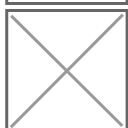
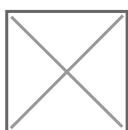
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Add to Compare

M1 Chemistry - International Track



Master's degree

Specialisation Chemistry

Enrolment type

Full-time academic programmes

Language(s) of instruction

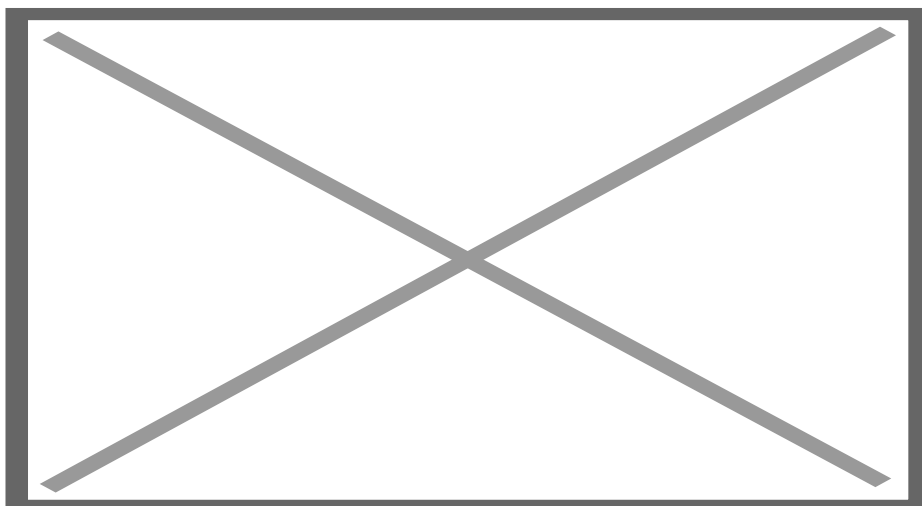
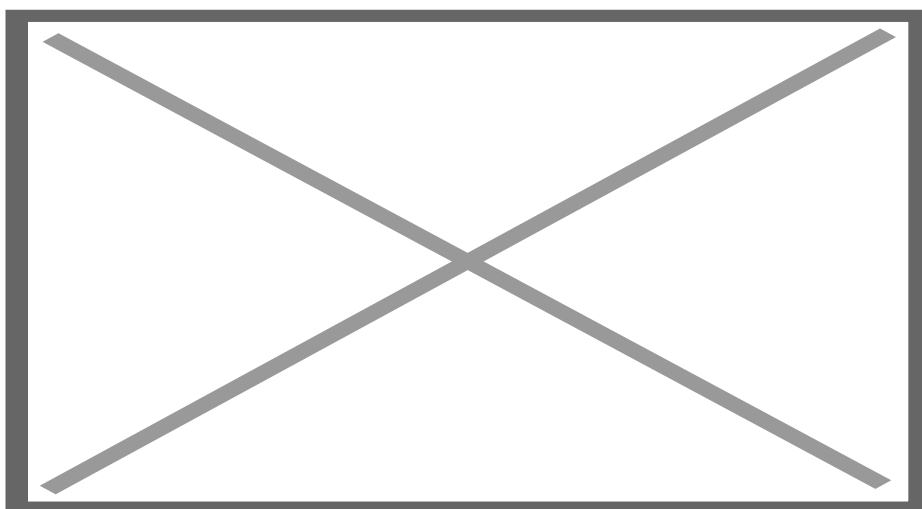
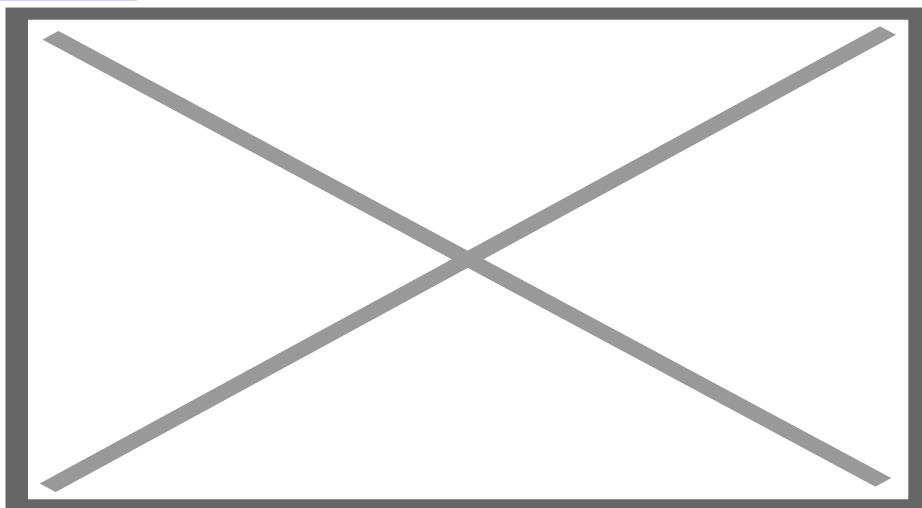
English

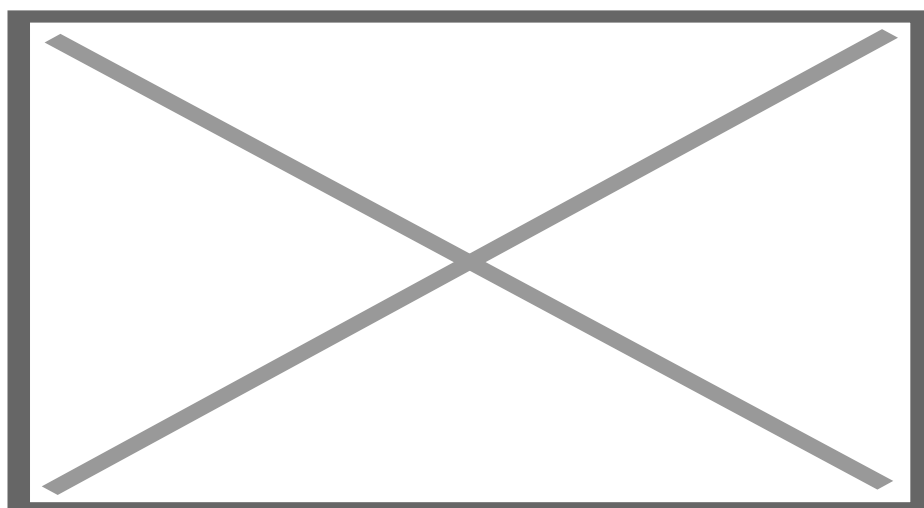
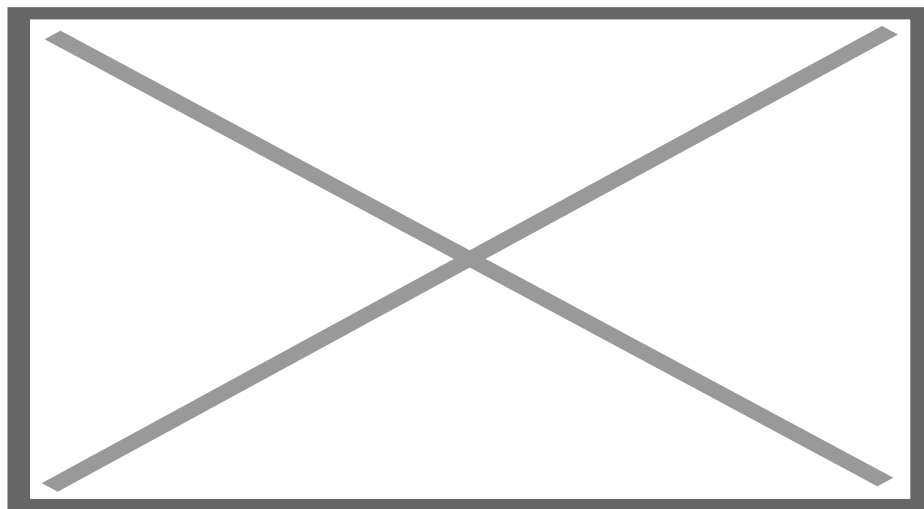
Two-year Master's degree in chemistry, entirely in English

This Master's degree trains experts in the cutting-edge fields of physical chemistry. It is designed to meet the growing demand for qualified experts in research and development fields such as sustainable development, renewable energies, nanosciences and nanomedicine. This two-year programme, with Sem1, Sem3 and Sem4 in common with the 1st year Master's Chemistry International track-Erasmus Mundus, and Sem2 with the CHIPS track of the 1st year Master's Chemistry, also offers Sem2 the opportunity to produce a bibliographical summary and a laboratory internship of at least 2 months.

[Télécharger la fiche détaillée](#)

[Apply Now](#)





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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

The first year of the master's program is focused on Chemistry and whose objective is to enable students:

- to acquire solid basic knowledge and know-how in chemistry by strengthening the notions studied during their bachelor's program semester
- to define their professional project by providing them with cross-disciplinary and prevocational knowledge and skills. The first year of the master's program Chemistry
 - International Track includes an internship that provides a first research experience in top-level scientific groups, and gives a large priority to lab trainings on up-to-date equipments and platforms. In addition to specific modules of this master's program, some of which are available to other students and will favor intercultural exchange.

Débouchés

Career prospects

Business Manager

chemical-environmental engineer

R&D Project Manager

Chef de projet

Design engineer industry / public research

Academic staff

Design Engineer

Research and Innovation Manager

Project Manager

Production Engineer

Secondary school teacher

Ingénieur.e recherche et développement

Laboratory Manager

Head of service

Further Study Opportunities

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

PhD

Master of Chemistry

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

15

Target Audience and Entry Requirements

Bachelor in Science

Période(s) de candidature

Inception Platform

From 30/01/2026 to 15/05/2026

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

Copy diplomas.

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
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
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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
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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
<u>Introduction to biophysics and microscopies for life sciences</u>	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
<u>Experimental methods on Innovative research Infrastructures (IR and UV-Vis spectroscopies, NMR, MS)</u>	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
Transferable skills	5	Semestre 1	0	24				
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Transferable skills

ECTS : 5

Semester: Semestre 1

Detail

Lecture: 0

Directed study: 24

Independant learning: 26

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

[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 UE enseignement

Subjects	ECTS	Semester	Lecture	directed study	practical class	Lecture/directed study	Lecture/practical class	directed study/practical class	class
Spectroscopies du solide	5	Semestre 2	21	10.5	3				

Subjects	ECTS	Semester	Lecture	directed study	practical class	Lecture/directed study	Lecture/practical class	directed study/practical class	other
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Spectroscopies du solide

ECTS : 5

Semester: Semestre 2

Detail

Lecture: 21

Practical study : 3

Directed study: 10.5

Tutored project 3

Language(s) of instruction

Anglais

Remote teaching

non

Prerequisites

Electrochemical Thermodynamic; Electrochemical Kinetic of metals. Cyclic Voltammetry

Programme/contents

Le « rayonnement synchrotron » comme source lumineuse. Visite de SOLEIL.

Analyse de composition de surfaces et interfaces : Principes de la technique ESCA-XPS. Principes de la technique AES. Projet bibliographique.

Analyse vibrationnelle de surfaces : Rappels de spectroscopie IR, Raman (sous air), Coherent Antistokes Raman Scattering (CARS). TP « analyse vibrationnelle d'interfaces ». Projet bibliographique.

Couplage électrochimie interfaciale sur semi-conducteurs (SC) et analyse XPS : Bases de l'électrochimie des SC. Caractérisation des surfaces de SC modifiées par voie électrochimique. Visite de la plateforme XPS.

Objectifs : Se familiariser avec les sources synchrotron.

Appréhender la complémentarité de techniques standards de caractérisation de surfaces et couches minces : spectroscopies XPS et d'électrons Auger, Raman et CARS.

Appréhender la complémentarité des mesures d'électrochimie interfaciale et de l'analyse XPS pour la caractérisation de surfaces de semi-conducteurs.

Synchrotron light source. Visit of the SOLEIL machine.

Composition analysis of surfaces and interfaces: Basics of ESCA-XPS spectroscopy. Basics of AES spectroscopy. Bibliography project.

Vibrational analysis of surfaces: IR spectroscopy

Subjects	ECTS	Semester	Lecture	directed study	practical class	Lecture/directed study	Lecture/practical class	directed study/practical class	d
Photo- et électro- stimulations	5	Semestre 2	2	27.5	7				

Subjects	ECTS	Semester	Lecture	directed study	practical class	Lecture/directed study	Lecture/practical class	directed study/practical class	other
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Photo- et électro- stimulations

ECTS : 5

Semester: Semestre 2

Detail

Lecture: 2

Practical study : 7

Directed study: 27.5

Tutored project 7

Language(s) of instruction

Anglais

Remote teaching

non

Prerequisites

Bachelor (L3) of chemistry or physical chemistry.

Programme/contents

Photophysics:

Steady-state absorption and emission from solution to solid state

Time-resolved fluorescence

Processes from the excited state

(solvatochromism, excimer/exciple...))

Quenching processes (dynamic, static, FRET, electron and proton transfer...)

Applications to key aspects of societal issues

Environnement, health, energy and safety

Learning objectives

Define and explain the fundamental principles and phenomena of photophysics.

Record and interpret steady-state and time-resolved absorption and emission spectra under appropriate experimental conditions.

Apply the scientific method to analyze and solve scientific questions.

Critically analyze and write a scientific article.

Design, conduct, and report a scientific research project.

Overall organisation

The course combines lectures, tutorials, and conferences with additional resources available on the ENT (past exams, scientific articles, lecture notes, podcasts, and books). Some sessions focus

Subjects	ECTS	Semester	Lecture	directed study	practical class	Lecture/directed study	Lecture/practical class	directed study/practical class	distance learning
Soft materials and chemistry	5	Semestre 2	20	13	6				
■									

Soft materials and chemistry

ECTS : 5

Semester: Semestre 2

Detail

Lecture: 20

Practical study : 6

Directed study: 13

Language(s) of instruction

Anglais

Remote teaching

non

Type of assessment

Evaluation Continue non Intégrale

[Practical courses](#)

5

Semestre 2

8

■

Practical courses

ECTS : 5

Semester: Semestre 2

Detail

Practical study : 8

Tutored project 13

Project : 10

Independant learning: 5

Language(s) of instruction

Anglais

Remote teaching

non

Type of assessment

Evaluation Continue non Intégrale

Bloc 3 Internship

Subjects	ECTS	Semester	Lecture	directed study	practical class	Lecture/directed study	Lecture/practical class	directed study/practical class	distance learning
Internship	10	Semestre 2		4					

Subjects	ECTS	Semester	Lecture	directed study	practical class	Lecture/directed study	Lecture/practical class	directed study/practical class	distance learning
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Internship

ECTS : 10

Semester: Semestre 2

Detail

Directed study: 4

Language(s) of instruction

Anglais

Remote teaching

non

Prerequisites

bibliographic report

Type of assessment

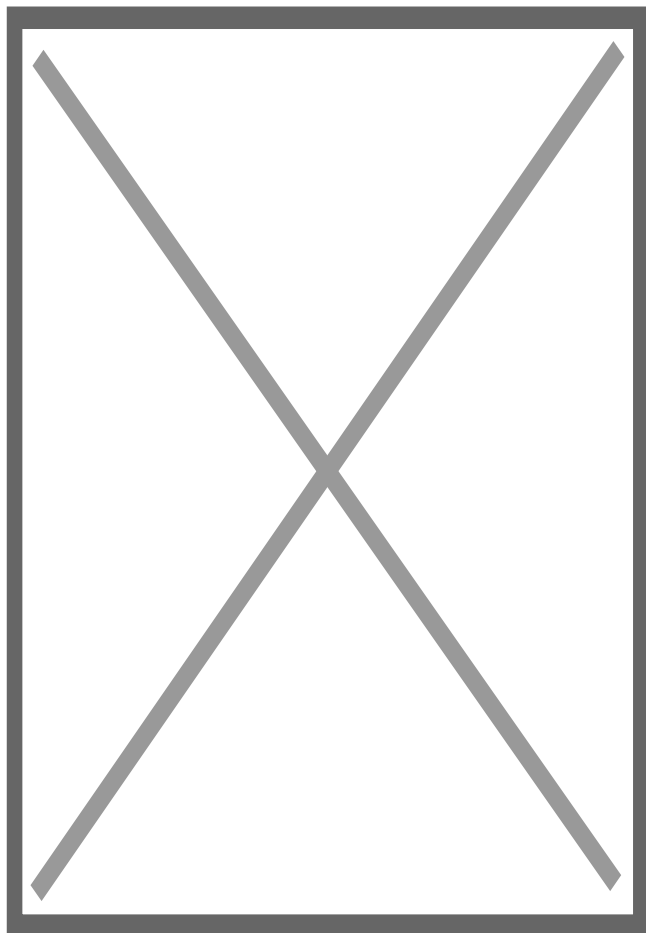
Evaluation Continue non Intégrale

Teaching Location(s)

ORSAY

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

-

Program office

Contact

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