

Master Recherche 2nd year “Science de la Matière” ENS Lyon - UCB Lyon Chemistry: concepts and applications

Andrew J Pell

andrew.pell@ens-lyon.fr



I. Introduction

M2 chemistry

More emphasis on practical chemistry at the cutting edge compared to ENS programme up to M1

New maquette has been in place since 2022-2023

Those who followed M1 chemistry in 2022-2023 should follow programme as prescribed

Those who followed M1 chemistry in 2021-2022 or earlier (under the old maquette) may need some modifications - to be discussed with me

Structure of the course (60 ECTS)

First semester (S3 - 30 ECTS)

Tronc commun: courses of advanced methods in physical chemistry (12 ECTS min)

UE de spécialisation au choix: specialised courses (12 ECTS min) - mix and match!

Organic and supramolecular chemistry

Materials, catalysis, and environment

Spectroscopy

Computational chemistry and modelling (part of M2 Modelisation)

Bibliographic report (6 ECTS)

Second semester (S4 - 30 ECTS)

Stage de 24 semaines: research internship (30 ECTS)

II. Semester 3: courses

Courses and timetable

Variety of courses available in all chemistry disciplines

Overall M2 chemistry option is combination of all or part of four separate programmes:

- ENS internal “M2 Chemistry” courses
- Some ENS internal “M2 Modelisation” courses
- Selection from UCBL “M2 Synthèse Organique et Chimie des Molécules Bioactives (SOCMB)”
- Selection from UCBL “M2 Chimie Inorganique”

ENS and UCBL timetables have been provided - consult correct one for details

Effort has been made to avoid timetable clashes, but a few remain!

Lecture courses

Tronc commun: courses advanced methods in physical chemistry
(12 ECTS min)

Advanced electrochemistry (3 ECTS)

Computational chemistry (this is first half of Advanced computational chemistry given as part of M2 Modelisation) (3 ECTS)

Reaction mechanisms in organic chemistry (3 ECTS)

Applied modern magnetic resonance (3 ECTS)

Crystallography and diffraction (3 ECTS)

Advanced mass spectrometry (3 ECTS)

If you did one of these courses in M1, you cannot repeat it in M2!

But you can do a replacement course (agreed on a case-by-case basis)

Given in M1 course 2021-2022 and earlier

Lecture courses

Organic and supramolecular chemistry

~~Medicinal chemistry (3 ECTS)~~

In vivo molecular and functional imaging (3 ECTS)

Properties of free organic radicals: from molecules to materials (3 ECTS)

Supramolecular chemistry: chemical and biological applications (3 ECTS)

Use of fluorine and heteroelements in organic chemistry (3 ECTS)

Heterocyclic chemistry of bioactive molecules (3 ECTS)

Organic chemistry by organometallic routes (3 ECTS)

Materials, catalysis, and environment

Texture and functionality in hybrid materials (3 ECTS)

Quantum approach to catalytic reactivity (3 ECTS)

Advanced structural characterisation of materials (3 ECTS)

From the molecule to optical materials (3 ECTS)

Spectroscopy

In vivo molecular and functional imaging (3 ECTS)

Frontiers in nuclear magnetic resonance (3 ECTS)

Chemistry of the f elements: structures and properties (3 ECTS)

From the molecule to optical materials (3 ECTS)

Computational modelling (with M2 Modelisation)

Advanced computational chemistry (6 ECTS, of which 3 given as Computational Chemistry in tronc commun)

Quantum approach to catalytic reactivity (3 ECTS)

Theoretical photophysics and chemistry: tdDFT (6 ECTS)

Timetable

Master des Sciences de la Matière - Année Universitaire 2023-2024

2023-09-04

Emploi du temps M2 semestre 3A (semaines 1-7, 11/9 - 27/10)

Jours	Heures	localisation	Offre interne Master SdM		Offre Master UCBL SOCBM et Chimie Inorganique	localisation
LUNDI	08h00-10h00	Amphi G	Theoretical photo-physics and -chemistry (T. Niehaus)		08h00-10h00	
	10h15-12h15	Amphi H	Computational chemistry (A. Padua)		10h15-12h15	
	13h30-15h30	Amphi G	Properties of organic free radicals: from the molecule to materials (E. Lacôte)		13h30-15h30	
	15h45-17h45	Amphi G	Advanced structural characterization of materials (A. Pell)		15h45-17h45	
MARDI	08h00-10h00	Amphi E* *12/09 Amphi L	Advanced electrochemistry (C. Bucher)		08h00-10h00	
	10h15-12h15	Amphi E* *12/09 Amphi L	Chemistry of the f-elements: structures and properties (O. Maury)		10h15-12h15	
	13h30-15h30	Amphi PC* *12/09 Amphi L *24/10 Amphi H	Quantum approach to catalytic reactivity (P. Raybaud)		13h30-15h30	
	15h45-17h45	Amphi PC* *12/09 Amphi L *24/10 Amphi H	Texture and functionality in hybrid materials (L. Bonneviot)		15h45-17h45	
MERCREDI	08h00-09h30				08h00-09h30	
	09h45-11h15				09h45-11h15	Doua
	14h00-15h30				14h00-15h30	Doua
	15h45-17h15				15h45-17h15	Doua
JEUDI	08h00-11h00	Doua (CRMN)	Applied modern magnetic resonance (S. Jannin)		08h00-09h30	Doua
	11h30-13h00	Doua	From molecules to optical materials (S. Parola)		11h30-13h00	
	14h00-15h00				14h00-15h30	
	15h15-16h45				15h45-17h15	Doua
VENDREDI	08h00-09h30	Doua (ISA)	Advanced mass spectrometry (F. Chirot)		08h00-09h30	
	10h15-12h15				09h45-11h15	Doua
	14h00-18h00	Amphi H & CBP	Theoretical photo-physics and -chemistry (T. Niehaus)		13h30-15h00	
	15h45-17h15	Doua	In vivo molecular and functional imaging (J. Hasserodt)		15h10-16h40	
	16h50-18h20				16h50-18h20	

Timetable

Master des Sciences de la Matière - Année Universitaire 2023-2024

Emploi du temps M2 semestre 3B (semaines 8-13, 6/11 - 15/12)

2023-07-20

Jours	Heures	localisation	Offre interne Master SdM		Offre Master UCBL SOCBM et Chimie Inorganique	localisation
LUNDI	08h00-10h00	Amphi G	(Advanced) Computational chemistry (A. Padua)		08h00-10h00	
	10h15-12h15	Amphi H	(Advanced) Computational chemistry (A. Padua)		10h15-12h15	
	13h30-15h30	Amphi G	Properties of organic free radicals: from the molecule to materials (E. Lacôte)		13h30-15h30	
	15h45-17h45	Amphi G	Advanced structural characterization of materials (A. Pell)		15h45-17h45	
MARDI	08h00-10h00	Amphi E	Advanced electrochemistry (C. Bucher)		08h00-10h00	
	10h15-12h15	Amphi E	Chemistry of the f-elements: structures and properties (O. Maury)		10h15-12h15	
	13h30-15h30	Amphi H	Quantum approach to catalytic reactivity (P. Raybaud)		13h30-15h30	
	15h45-17h45	Amphi H	Texture and functionality in hybrid materials (L. Bonneviot)		15h45-17h45	
MERCREDI	08h00-09h30				08h00-09h30	
	09h45-11h15				09h45-11h15	Supramolecular chemistry: chemical and biological applications (25/10 - 6/12, J. Leclaire) Doua
	14h00-15h30				14h00-15h30	Organic chemistry by organometallic routes (B. Andrioletti) Doua
	15h45-17h15				15h45-17h15	Use of fluoroine and heteroatoms in organic chemistry (B. Joseph) Doua
JEUDI	08h00-11h00	Doua (CRMN)	Frontiers in NMR (A. Pell and CRMN)		08h00-11h00	Heterocyclic chemistry in active biomolecules (26/10 - 30/11, B. Joseph) Doua
	11h30-13h00	Doua	From molecules to optical materials (S. Parola)		11h30-13h00	
	14h00-15h00				14h00-15h30	
	15h15-16h45				15h45-17h15	Doua
VENDREDI	08h00-09h30	Doua (ISA)	Advanced mass spectrometry (F. Chiroi)		08h00-09h30	
	10h15-12h15				09h45-11h15	Supramolecular chemistry: chemical and biological applications (27/10 - 1/12, J. Leclaire) and Crystallography and diffraction (D. Luneau) Doua
	13h30-15h00				13h30-15h00	
	15h45-17h15	Doua	In vivo molecular and functional imaging (J. Hasseroedt)		15h10-16h40	
	16h50-18h20				16h50-18h20	

III. Semester 4: internship

Research reports

Bibliographic report (S3)

Based on the subject of your research internship in S4

Report evaluated by a jury comprising two teachers specialising in the chosen topic

Research internship (S4)

Large selection of internships on offer

Dissertation and defence

Same evaluation jury as for the bibliographic report

Choosing research internship

Entirely up to you: choose a placement in Lyon, or abroad

If you choose to go abroad, up to you to sort out visa/work permit/insurance etc - discuss this with your proposed host lab!

Effective communication with your host lab is essential, both before and during internship

Ensure that the project is of the level required by M2 - e.g. an M2 student in France is equivalent to a 2nd year grad student in USA!

Some host organisations require a non-disclosure agreement (NDA) - this is OK, but should be communicated before the submission of your bibliographic report!

Choosing research internship

You need to send me:

- Host supervisor name and contact details
- Host university / company
- Project title
- Abstract

When your internship has been authorized, only then can you complete the convention de stage

Timetable for year

Sept 6 10h00: Réunion rentrée

Sept 11 - Oct 27: Courses for S3A

30 Oct - Nov 5: Vacances Toussaints (NB ENS and UCBL holidays may be different!)

Nov 6 - Dec 15: Courses for S3B

Nov 10: Deadline for choice of internship

Mid Dec: Signing of convention de stage

Jan 8: Earliest possible start for internship (provided that all your S3 exams are done!)

Jan 15: Deadline for submission of bibliographic reports

Jan 22 - Jan 26: Bibliographic report oral examinations (online)

Jan 31: Last possible day for S3 exams

Feb 1: Latest start day for internship

Mid Feb: S3 jury

First half of July: Research report oral examinations (possibly online, deadline for report submission 10 days before exam)

Jul 31: Latest end day of S4 internship

End Jul: S4 jury

Dates may be subject to change

IV. Courses in detail