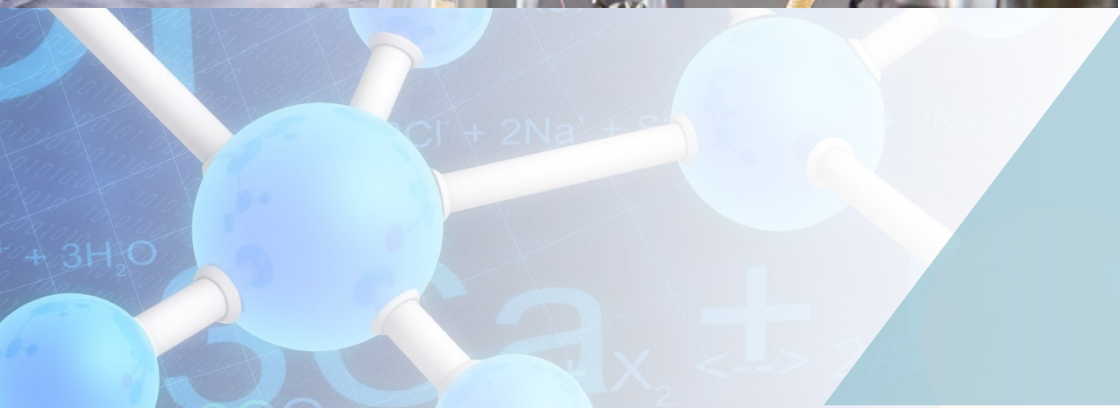
Le Mans Université – Faculty of Science & Technology

MASTER IN CHEMISTRY

Faculté des Sciences & Techniques
Le Mans Université



Master's degree in Chemistry overview

The Master's degree in Chemistry consists of 4 semesters organized into teaching units (UE), also known as modules. Lectures, tutorials (TD) and practical work (TP) are included in most of the teaching units. The Master's first year contains units dedicated to advanced knowledges and hands-on experience in synthesis and characterization of molecules, of polymer materials and of inorganic materials. In addition, units are dedicated to an 8-weeks internship, professional integration and English. During the Master's second year, additional units are dedicated to Corporate Knowledge, English, a cutting-edge project with a recognized laboratory on elaboration, characterization and properties of molecules and materials (Institut des Molécules et Matériaux du Mans-IMMM) and an internship of at least 4 months. The award of 30 ECTS credits (European Credit Transfer and Accumulation System) validates each semester, the Master's degree being awarded on completion of 120 ECTS credits. A semester is validated by capitalizing or offsetting the UEs that make it up (average ≥ 10/20). The validation of a year (Master 1 or Master 2) is conditional on obtaining an average ≥ 10/20 over all 2 semesters of this year (possible compensation between the 2 semesters).
The Master's degree in Chemistry is offered in both face-to-face and distance learning formats, as well as in a Master 2 sandwich course.

Training objective

The aim of Le Mans Université's Master's degree in Chemistry is to train executives/managers able to take up employment in research and development in academia and industry within a number of sectors or to progress to PhD study focused on synthesis and characterization of molecules or materials. Industrial sectors concerned are: automotive, aeronautics, pharmaceuticals, food processing, cosmetics, construction, energy transition, research and consulting, etc...
The course combines disciplinary, cross-disciplinary, transferable skills, linguistic and professional skills. Some examples of skills are:

- Use the conceptual backgrounds of chemistry to provide solutions to a scientific question.
- Use a wide range of modern instrumentation and analytical methods for characterizing molecular compounds and materials to answer scientific questions.
- Master methodologies for synthesizing innovative molecules and materials.
- Develop arguments with a critical mind.
- Communicate across disciplines using various media e.g. written reports, posters, oral presentations.
- Work as part of a team as well as independently and responsibly on a project.

Training organization

The Master's degree in Chemistry is organized around common training modules and a progressive specialization from semester 2. Three majors based on the expertise of IMMM laboratory are possible for specialization: the Chemistry of Inorganic Materials (MI) or the Chemistry and Physical Chemistry of Polymers (POL) or Organic Synthesis (SO), while a teaching module from another specialty is retained in semesters 2, 3 and 4.

The common training modules include analytical chemistry, separative techniques, English, scientific communication methodology and bibliography, professional integration and corporate knowledge.

Master 1

Semester 1

NMR spectroscopy (30h/3ECTS)
Thermal analysis (20h/ 3ECTS)
Molecular and crystalline symmetry (30h/3ECTS)
Organic structures: elaboration and applications (50h/5ECTS)
Inorganic materials: from elaboration to applications (50h/5ECTS)
Polymers: synthesis, characterization and properties (50h/5ECTS)
Bibliography and scientific communication (10h/1ECTS)
Professional integration assistance (16h/2ECTS)
English (20h/3ECTS)

Semester 2

Chromatography and mass spectrometry (20h/2ECTS))
X-ray diffraction (20h/2ECTS)
Surface analysis (19h/2ECTS)
Raman IR, UV, fluorescence spectroscopy (15h/2ECTS)

MI	POL	SO
• Magnetism (15h/2ECTS) • X-ray diffraction of polycristalline solids (15h/2ECTS) • Glass materials and defects (30h/4ECTS) • Hybrid and mesoporous materials, biomaterials (30h/4ECTS)	• Synthesis and macromolecular characteristics of polymers (30h/4ECTS) • Properties of polymers in solution (30h/4ECTS) • Physical and thermomechanical properties of polymers	• Heterocyclic chemistry (30h/4ECTS) • Heteroelements in organic chemistry (30h/4ECTS) • Strategy in synthesis: selectivities and protections (30h/4ECTS)

Teaching unit chosen among the 2 other majors (30h/4ECTS)

Internship (2-4 months/6ECTS)

Master 2

Semester 3

MI	POL	SO
• X-ray powder diffractometry (3 ECTS) • Materials elaboration methods (3 ECTS) • Luminescence in materials (1.5 ECTS) • Solid-state NMR (1.5 ECTS) • Microscopies (3 ECTS) • Organic electronics (3 ECTS) • Transport phenomena in solids (3 ECTS)	• Polymerization Processes (3 ECTS) • Polymer nanostructures: strategies for synthesis (3 ECTS) • Polymer nanostructures: properties and characterization (3 ECTS) • Living and controlled polymerizations (3 ECTS) • Polymer physics (3 ECTS) • Rheology (3 ECTS)	• Green chemistry and organometallic catalysis (3 ECTS) • Asymmetric synthesis (3 ECTS) • Retrosynthetic analysis and total synthesis (3 ECTS) • Radical chemistry and applications (2 ECTS) • Elaboration and properties of biomolecules (3 ECTS) • Theoretical and computational chemistry (4ECTS)

Teaching unit chosen among the 2 other majors (3ECTS)

Experimental project in the Laboratory
(9 weeks/9ECTS)

Semester 4

- Advanced NMR spectroscopy (3ECTS)
  English (3ECTS)
- Knowledge of the structuration and organization of a company (2ECTS)

Internship (3-6 months/22ECTS)

Le Mans Université's Master degree in Chemistry includes a significant number of internships and laboratory projects. The Master's program is supported by the world-known Institut des Molécules et Matériaux du Mans (IMMM), which offers a highly complementary range of expertises. Research activities cover a wide range of chemistry and physics disciplines. This guarantees students comprehensive, cutting-edge, interdisciplinary skills.

How do I register?

The Ministry of Higher Education and Research has set up a national portal dedicated to Master's degree applications: www.monmaster.gouv.fr

Registration fee:
As an indication, Master's registration fees for the start of the 2023-2024 academic year were €243 payable after payment of the €95 CVEC. Go to: cvec.etudiant.gouv.fr

Scholarship holders are exempt from paying the CVEC and registration fees. Students who have received a conditional grant are automatically detected on the site and can download their CVEC payment certificate once they have completed the online procedure.

Please note: to apply for a grant and accommodation (DSE) for the start of the new school year in September, you need to fill in the form from mid-January on the CROUS website: www.crous-nantes.fr/bourses/

Master's coordinators :

Face-to-face training :
C. Gaulon-Nourry & S. Pascual — master-chimie@univ-lemans.fr

Distance learing :
C. Legein — christophe.legein@univ-lemans.fr

Education Department: sco-sciences@univ-lemans.fr +33 2 43 83 32 07
Orientation & professional integration: suio@univ-lemans.fr
Le Mans University: www.univ-lemans.fr +33 2 44 02 20 64
Faculty of Sciences: sciences.univ-lemans.fr

Le Mans Université

Avenue Olivier Messiaen72085
Le Mans Cedex 9

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Le Mans Université