

CHEMISTRY

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www.mcla.edu/chem (<http://www.mcla.edu/chem/>)

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Chemistry Major

Students graduating with a major in Chemistry will be able to:

- Demonstrate knowledge of basic principles and theories in analytical, organic, physical chemistry, inorganic, and biochemistry
- Apply chemical principles through problem solving and laboratory experimentation
- Demonstrate competency in use of sophisticated laboratory instruments
- Students with a Concentration in Biochemistry will also design, implement, and analyze biochemical experiments involving nucleic acids and proteins

Chemistry Minor

Students graduating with a minor in Chemistry will be able to:

- Demonstrate knowledge of basic principles and theories in analytical, organic and one of the following sub areas: inorganic, biochemistry or physical chemistry
- Apply chemical principles through problem solving and laboratory experimentation
- Demonstrate competency in use of basic laboratory instruments.

Programs

- Chemistry - Biochemistry Concentration, B.S. (<https://catalog.mcla.edu/undergraduate/academic-programs-study/chemistry/chemistry-biochemistry-concentration-bs/>)
- Chemistry Minor (<https://catalog.mcla.edu/undergraduate/academic-programs-study/chemistry/chemistry-minor/>)
- Chemistry, B.S. (<https://catalog.mcla.edu/undergraduate/academic-programs-study/chemistry/chemistry-bs/>)

CHEM 150 Introduction to Chemistry I 4 cr

Studies chemical principles, theories, laws and their applications. Topics include electronic and nuclear behavior, periodicity, stoichiometry, structure and bonding. Teaches laboratory techniques through the performance of experiments related to the above topics. Required laboratory.

Attributes: Core Science & Tech w/lab (CSTL), Environmental Studies (ENVI)

CHEM 152 Introduction to Chemistry II 4 cr

Studies chemical principles, theories, laws and their applications. Topics include oxidation and reduction, kinetics, thermodynamics, equilibrium and descriptive inorganic chemistry. Teaches laboratory techniques through the performance of experiments related to the above topics. Required laboratory.

Prerequisite: CHEM 150

Attributes: Core Science & Tech w/lab (CSTL), Environmental Studies (ENVI)

CHEM 201 Organic Chemistry I 4 cr

Studies the structure, properties and synthesis of organic compound and the mechanisms of their reactions. Topics include bonding, molecular orbitals, stereochemistry, resonance, acid-based chemistry, nomenclature, infrared spectroscopy, conformational analysis and substitution and elimination reactions. Required laboratory.

Prerequisite: CHEM 152

CHEM 202 Organic Chemistry II 4 cr

Builds on the concepts introduced in CHEM 201 by studying the reactivity of other classes of compounds including aromatic, unsaturated, alcohols, ethers, carbonyl derivatives and nitrogen-containing compounds. Nuclear magnetic resonance (NMR) will be studied. Basic total synthesis will be covered throughout the semester as new reactions are introduced. Required laboratory.

Prerequisite: CHEM 201

CHEM 250 Inorganic Chemistry 3 cr

Explores the structures, properties and chemical reactivity of the elements and of many compounds. This course builds upon the principles that have been introduced in general chemistry and will enhance understanding of atomic structure and bonding models, periodic trends and molecular symmetry, including molecular orbitals. These concepts are directly applicable to organic and biochemistry and environmental science.

Prerequisite: CHEM 152

CHEM 301 Physical Chemistry I 3 cr

Studies the concepts and methods of classical thermodynamics and their application to chemical systems including: chemical reactions, phase changes, solubility, equilibrium, kinetics and electrochemistry.

Prerequisite: CHEM 152, MATH 320

CHEM 302 Physical Chemistry II 3 cr

Develops the mathematical and conceptual foundations of quantum mechanics. Includes applications of quantum theory to atomic and molecular spectroscopy. Group theory will be introduced and then applied to atomic and molecular structure and motion, rotational, vibrational and electronic spectra.

Prerequisite: CHEM 301

Corequisite: CHEM 401

CHEM 310 Analytical Chemistry 4 cr

Examines classical and modern methods of chemical analysis. Emphasis is placed on chemical equilibrium, titrimetry and selected analytical applications of instrumental methods, including visible, infrared, fluorescence spectroscopy, gas chromatography and electro-chemistry. Required laboratory focuses on analytical techniques.

Prerequisite: CHEM 152

CHEM 380 Drug Chemistry 3 cr

Explores the chemistry of drug design, synthesis and action. The methods used to design potential new drug molecules will be discussed as well as how they are either isolated from natural sources or created in the laboratory.

Prerequisite: CHEM 202, CHEM 250

CHEM 395 Special Topics in Chemistry 1-4 cr

Covers current topics in chemistry including: bioinorganic chemistry, bioorganic chemistry, forensic chemistry and physical chemistry. Depending on the topic, laboratory exercises could be conducted as part of the course content. This course does not require an independent project.

Prerequisite: Junior/senior status or department approval

Repeatable: Unlimited Credits

- CHEM 401 Advanced Laboratory** 3 cr
Examines bulk macroscopic and microscopic properties of matter. Topics include computer applications to statistical methods and data analysis, glass blowing and techniques of experimental physical chemistry.
Prerequisite: CHEM 301
Corequisite: CHEM 302
- CHEM 405 Advanced Synthetic Chemistry** 3 cr
Introduces the student to a variety of advanced methods in the synthesis and characterization of organic and inorganic compounds. A wide range of compounds will be synthesized, including organic compounds, bioinorganic compounds, transition-metal complexes, and coordination compounds.
Prerequisite: CHEM 202, CHEM 310
- CHEM 410 Instrumental Methods in Chemistry** 3 cr
Explores the role of instruments in chemical research. The theory and hands-on experience of a variety of analytical instruments will be covered. These include: ultraviolet, visible, fluorescence and infrared spectroscopic instrumentation as well as high pressure liquid chromatography (HPLC) and gas chromatography (GC). This course is laboratory-based with minimal lecture.
Prerequisite: CHEM 310
- CHEM 420 Special Topics in Chemistry** 1-4 cr
Covers current topics in chemistry including: bioinorganic chemistry, bioorganic chemistry, forensic chemistry and physical chemistry. Depending on the topic, laboratory exercises could be conducted as part of the course content. This course requires an independent project.
Prerequisite: Junior/senior status or department approval
Repeatable: Unlimited Credits
- CHEM 440 Advanced Organic Chemistry** 3 cr
Provides the student with a deeper understanding of some of the concepts and reactions that are discussed in CHEM 201 and CHEM 202. The course also introduces new reactions such as the Aldol, Claisen Rearrangement and Ene reactions. The role of these reactions in the total synthesis of natural products is also explored. Current topics in organic chemistry will be discussed.
Prerequisite: CHEM 202
- CHEM 490 Chemistry Seminar** 1 cr
Presents current topics in chemistry. Primary literature articles will be assigned and discussed in class. Enrolled students will present topics of their choice. Attendance at academic lectures at other colleges/universities is possible.
Prerequisite: Senior status
Repeatable: Unlimited Credits
- CHEM 500 Independent Study in Chemistry** 1-3 cr
For chemistry majors who wish to conduct an independent project on a specific topic in chemistry. The project will be supervised by a faculty member. The course requires a final scholarly report detailing the finding of the project. This course may be taken more than once for lengthy projects.
Prerequisite: Junior/senior status, department approval
Repeatable: Maximum of 12 credits
- CHEM 540 Internship in Chemistry** 1-15 cr
Offers the upper-level chemistry major an opportunity to practice chemistry in an appropriate professional situation. The student will work with a faculty sponsor and an off-campus supervisor in gaining experience significant to the major.
Prerequisite: Junior/senior status, department approval
Repeatable: Maximum of 15 credits
- Chemistry majors may pursue initial licensure as a teacher of chemistry for the middle school or secondary levels. Students seeking any of these licenses must complete a chemistry major and a licensure program in education.