

CHEMISTRY

(413) 662-5451

Chairperson: Robert Harris, Ph.D.

Email: Robert.Harris@mcla.edu

PROGRAM AVAILABLE BACHELOR OF SCIENCE IN CHEMISTRY CONCENTRATION IN BIOCHEMISTRY CHEMISTRY MINOR

CHEMISTRY MAJOR PROGRAM

Students graduating with a minor 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 various laboratory instruments.

CHEMISTRY MINOR PROGRAM

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.

CHEMISTRY MAJOR

Requirements

BIOL 150 Introduction to Biology

4 cr

BIOL	360	Biochemistry	3 cr
CHEM	150	Introduction to Chemistry I	4 cr
CHEM	152	Introduction to Chemistry II	4 cr
CHEM	201	Organic Chemistry I	4 cr
CHEM	202	Organic Chemistry II	4 cr
CHEM	250	Inorganic Chemistry	3 cr
CHEM	301	Physical Chemistry I	3 cr
CHEM	302	Physical Chemistry II	3 cr
CHEM	310	Analytical Chemistry	4 cr
CHEM	401	Advanced Laboratory	3 cr
CHEM	410	Instrumentation lab	3 cr
CHEM	490	Chemistry Seminar	1 cr
MATH	150	Precalculus	3 cr
MATH	220	Calculus I	3 cr
MATH	320	Calculus II	3 cr
PHYS	151	Introduction Mechanics	4 cr
PHYS	251	Introduction to Electricity and Magnetism	4 cr

TOTAL CHEMISTRY MAJOR REQUIREMENTS 60 cr

CONCENTRATION IN BIOCHEMISTRY

Requirements

BIOL	150	Introduction to Biology	4 cr
BIOL	360	Biochemistry	3 cr
BIOL	361	Advanced Biochemistry	3 cr
BIOL	410	Biotechniques	3 cr
CHEM	150	Introduction to Chemistry I	4 cr
CHEM	152	Introduction to Chemistry II	4 cr
CHEM	201	Organic Chemistry	4 cr
CHEM	202	Organic Chemistry II	4 cr
CHEM	250	Inorganic Chemistry	3 cr

CHEM	310	Analytical Chemistry	4 cr
CHEM	301	Physical Chemistry I	3 cr
CHEM	410	Instrumental Methods	3 cr
CHEM	490	Chemistry Seminar	1 cr
MATH	150	Precalculus	3 cr
MATH	220	Calculus I	3 cr
MATH	320	Calculus II	3 cr
PHYS	151	Introduction Mechanics	4 cr
PHYS	251	Introduction to Electricity and Magnetism	4 cr
TOTAL CONCENTRATION BIOCHEMISTRY			
REQUIREMENTS			60 cr

CHEMISTRY MINOR

Requirements

CHEM	150	Introduction to Chemistry I	4 cr
CHEM	152	Introduction to Chemistry II	4 cr
CHEM	201	Organic Chemistry I	4 cr
CHEM	202	Organic Chemistry II	4 cr
CHEM	310	Analytical Chemistry	4 cr
One upper-level chemistry elective (Excluding seminars and core curriculum courses)			3 cr

TOTAL CHEMISTRY MINOR REQUIREMENTS **23 cr**

TEACHING LICENSURE

Students majoring in chemistry may opt to pursue initial teacher licensure as an early childhood teacher or elementary teacher. Also, Chemistry majors may pursue initial licensure as a teacher of chemistry for the middle school or secondary levels. Students seeking any of these licensures must complete a chemistry major, education major and a licensure program in education.

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 Coreq: 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 to 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

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 Coreq: 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 to 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

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

CHEM 500 Independent Study in Chemistry 1 to 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

CHEM 540 Internship in Chemistry 1 to 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