

## PROGRAM AVAILABLE

### CHEMISTRY MINOR

#### CHEMISTRY MINOR PROGRAM

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

- C demonstrate knowledge of basic principles and theories in analytical, organic, inorganic, and physical chemistry
- C apply chemical principles through problem solving and laboratory experimentation
- C demonstrate competency in use of various laboratory instruments

#### 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)	<u>3 cr</u>

**TOTAL CHEMISTRY MINOR REQUIREMENTS 23**

## COURSE LISTINGS

#### CHEM 100 Chemistry Concepts

3 cr

Examines some of the fundamentals of chemistry and the historical and logical development of modern chemistry. Applies principles and concepts to current issues in society such as acid rain, nuclear power plants, ozone holes and pollution. For students not majoring in science.

**Prerequisite:** None

#### 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.

**Prerequisite:** None

#### 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

#### CHEM 201 Organic Chemistry I

4 cr

Studies the structure, properties, and synthesis of certain aliphatic compounds and the mechanisms of their reactions. Topics include bonding, stereochemistry, resonance, and kinetics. Required laboratory.

**Prerequisite:** CHEM 152

#### CHEM 202 Organic Chemistry II

4 cr

Studies the application of concepts and techniques acquired in CHEM 201 to aromatic compounds and to additional classes of aliphatic compounds. Methods of identification including spectroscopy are introduced. Required laboratory.

**Prerequisite:** CHEM 201

#### CHEM 242 Chemistry and Its Relation to the World

4 cr

Examines fundamental principles of chemistry, the historical development of chemical theories, and how chemistry relates to other scientific disciplines. Topics include the environment, forensic laboratory quality, adverse drug interactions, and perchlorates in water. Laboratory experiments illustrate chemical concepts and how scientific conclusions are derived from laboratory results.

**Prerequisite:** None

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- CHEM 300 Chemistry and the Environment** **3 cr**  
Studies global cycles, atmospheric and oceanic systems, environmental thermodynamics, and selected environmentally important chemical systems. Emphasizes contemporary problems such as hazardous wastes, ozone depletion, global warming, and acid rain. Designed to increase awareness of chemical processes as part of the natural environment and of human impact on those processes.  
**Prerequisite:** CHEM 100 or CHEM 150
- CHEM 301 Physical Chemistry I** **3 cr**  
Studies the fundamental laws and theories of chemistry. Includes thermodynamics, gases, and phase and reaction equilibria.  
**Prerequisite:** MATH 320 and CHEM 202
- CHEM 302 Physical Chemistry II** **3 cr**  
Continues CHEM 301. Includes ionic equilibria, electrochemistry, and kinetics.  
**Prerequisite:** CHEM 301
- CHEM 305 Environmental Organic Chemistry** **3 cr**  
Studies the structure, physical and chemical properties, and dispersal of various organic pollutants. Topics will also include how these pollutants entered into the environment, where they have concentrated, and how to remove them. Various instrumental methods of detection of pollutants will also be discussed.  
**Prerequisite:** None
- 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.  
**Prerequisite:** CHEM 201
- CHEM 320 Environmental 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 as applied to environmental problems.  
**Prerequisite:** CHEM 152
- CHEM 350 Ethical Issues in Science** **3 cr**  
Studies ethical theories and their applications to current controversial issues in science. Includes genetic engineering, human and animal experimentation, euthanasia, genetic testing and screening, environmental concerns, chemical and biological warfare, and the moral responsibilities of scientists.  
**Prerequisite:** Any philosophy course and a course in chemistry, biology, or physics.
- CHEM 401 Advanced Laboratory I** **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 310 concurrent enrollment in CHEM 301 and CHEM 410
- CHEM 402 Advanced Laboratory II** **3 cr**  
Continues CHEM 401.  
**Prerequisite:** CHEM 401, CHEM 410, concurrent enrollment in CHEM 302
- CHEM 410 Instrumental Methods of Chemical Research** **3 cr**  
Examines the phenomenological origins and quantitative application of spectroscopy. Topics include spectroscopic instrumentation, and rotational, infrared, Raman, ultraviolet, visible, and fluorescence spectroscopy.  
**Prerequisite:** CHEM 310
- CHEM 440 Advanced Organic Chemistry** **3 cr**  
Studies useful sequences for synthesizing various classes of organic compounds. Topics include Diels-Alder reaction, Claisen condensation, Haworth synthesis, Wittig reaction, Reformatsky reaction, and others.  
**Prerequisite:** CHEM 202

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**CHEM 450 Physical Organic Chemistry** **3 cr**  
Studies reaction mechanisms extensively. Topics include primary and secondary isotope effects, acid-base catalysis, steric and polar effects, Hammett free-energy relationships, orbital symmetry reactions, and solvent effects.  
**Prerequisite:** CHEM 202

**CHEM 460 Quantum Chemistry** **3 cr**  
Develops the mathematical and conceptual foundations of quantum mechanics. Includes applications of quantum theory to atomic and molecular spectroscopy.  
**Prerequisite:** Concurrent enrollment in CHEM 302

**CHEM 490 Chemistry Seminar** **1 cr**  
Presents selected topics in or related to chemistry.  
**Prerequisite:** Senior standing in chemistry

**CHEM 500 Independent Study** **1-3 cr**  
Open to juniors and seniors who wish to read in a given area or to study a topic in depth. Written reports and frequent conferences with the advisor are required.  
**Prerequisite:** Junior/senior status; department approval

**CHEM 540 Internship** **3-15 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:** Department approval; junior/senior status