

# Chemistry (CHEM)

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## Courses

### **CHEM 108. Survey of General, Organic and Biochemistry. 3 Credits.**

Chemistry and measurements; states of matter and changes of state; atoms and elements; ionic and molecular compounds; chemical reactions; solutions; acids, bases and pH; organic nomenclature; introduction to organic functional groups, physical properties and reactions; carbohydrate structure and function; amino acids and protein structure and function; lipid structure and function; nucleic acid structure and function.

P: MATH 101 with at least a C, or WPT-MFND score >465 and WPT-AALG score >525, and CHEM 109 or conc enr

Fall and Spring.

### **CHEM 109. Survey of General, Organic, and Biochemistry Laboratory. 1 Credit.**

Laboratory Course that accompanies CHEM 108.

P: CHEM 108 or concurrent enrollment; CHEM 207 or concurrent enrollment

Fall and Spring.

### **CHEM 168. Sustainability Chemistry. 3 Credits.**

Studying how chemistry and sustainability can relate to and improve our lives and our environment is a focus of this course. Specific topics that will be covered include scientific literacy, green chemistry, climate change, pollution, recycling, chemical usage in industry, best practices in sustainability, and more.

Fall and Spring.

### **CHEM 198. First Year Seminar. 3 Credits.**

First Year Seminar, topics vary.

Reserved for New Incoming Freshman.

### **CHEM 207. Laboratory Safety. 1 Credit.**

This course examines safety within the science laboratory with emphasis on practical application. Topics include current safety regulations, identification of hazards, chemical labeling and storage, waste management, personal protective equipment, ventilation, spill response, and biosafety.

Fall and Spring.

### **CHEM 211. Principles of Chemistry I. 4 Credits.**

Chemistry and measurement; atoms, molecules, and ions; chemical formulas, equations, and reactions; gaseous state; thermochemistry; quantum theory of the atom; electron configurations and periodicity; ionic and covalent bonding; molecular geometry and chemical bonding; and states of matter; liquids and solids.

P: MATH 104 or greater or eq or conc enr in MATH 104 or WPT-MFND score >465 and WPT-AALG score >525 and WPT-TAG score >525 & CHEM 213 or concurrent enrollment; can't repeat until open enrollment begins.

Fall and Spring.

### **CHEM 212. Principles of Chemistry II. 4 Credits.**

Solutions; kinetics; chemical equilibrium; acids and bases; acid-base equilibrium, solubility and complex ion formation; thermodynamics and equilibrium; electrochemistry; and nuclear chemistry.

P: MATH 104 or greater with at least a C grade or WPT-MFND score >465 and WPT-AALG score >525 and WPT-TAG score >525; and CHEM 211 and CHEM 213 with at least a C grade; and conc enr in CHEM 214

Fall and Spring.

### **CHEM 213. Principles of Chemistry I Laboratory. 1 Credit.**

Laboratory Course that accompanies Chem 211.

P: CHEM 211 or concurrent enrollment; and CHEM 207 or concurrent enrollment

Fall and Spring.

### **CHEM 214. Principles of Chemistry II Laboratory. 1 Credit.**

Laboratory Course that accompanies Chem 212

P: CHEM 212 or concurrent enrollment; and CHEM 207 or concurrent enrollment

Fall and Spring.

### **CHEM 298. Independent Study. 1-4 Credits.**

Independent study is offered on an individual basis at the student's request and consists of a program of learning activities planned in consultation with a faculty member. A student wishing to study or conduct research in an area not represented in available scheduled courses should develop a preliminary proposal and seek the sponsorship of a faculty member. The student's advisor can direct him or her to instructors with appropriate interests. A written report or equivalent is required for evaluation, and a short title describing the program must be sent early in the semester to the registrar for entry on the student's transcript.

P: fr or so st with cum gpa > or = 2.50; or jr or sr st with cum gpa > or = 2.00.

Fall and Spring.

**CHEM 299. Travel Course. 1-6 Credits.**

Travel courses are conducted to various parts of the world and are led by one or more faculty members. May be repeated to different locations.

P: cons of instr & prior trip arr & financial deposit.

**CHEM 300. Bio-Organic Chemistry. 3 Credits.**

Those aspects of the field pertinent to students entering the biologically related disciplines: Basic organic chemistry, natural products and molecules important to biological systems.

P: Chem 212 & 214 with at least a C grade or Chem 108 & 109 with at least a C grade.

Spring.

**CHEM 301. Bio-Organic Chemistry Laboratory. 1 Credit.**

Laboratory course to accompany Chem 300.

P: Chem 300 or conc enr; and Chem 207 or conc enr

Spring.

**CHEM 302. Organic Chemistry I. 3 Credits.**

The chemistry of carbon compounds: structure, reactions, synthesis, stereochemistry, reaction mechanisms, spectroscopy, nomenclature and physical properties of both aliphatic and aromatic compounds; covers all common functional groups and natural products.

P: Chem 212 and 214 with at least a C grade.

Fall and Spring.

**CHEM 303. Organic Chemistry II. 3 Credits.**

The chemistry of carbon compounds: structure, reactions, synthesis, stereochemistry, reaction mechanisms, spectroscopy, nomenclature and physical properties of both aliphatic and aromatic compounds; covers all common functional groups and natural products.

P: Chem 302 with at least a C grade.

Fall and Spring.

**CHEM 304. Organic Chemistry Laboratory I. 1 Credit.**

Basic and intermediate synthesis, basic and intermediate instrumental techniques in organic chemistry.

P: CHEM 212 and CHEM 214 with at least a C grade; and CHEM 302 with at least a C grade or conc enr; and CHEM 207 or conc enr

Fall and Spring.

**CHEM 305. Organic Chemistry Laboratory II. 1 Credit.**

Basic and intermediate synthesis, basic and intermediate instrumental techniques in organic chemistry.

P: Chem 303 or conc enr; and Chem 304 with at least a C grade; and Chem 207 or conc enr

Fall and Spring.

**CHEM 306. Organic Chemistry Lab I & II. 2 Credits.**

Basic laboratory techniques for organic chemistry including commonly used synthetic methods, purification and characterization of reaction products.

**CHEM 311. Analytical Chemistry. 4 Credits.**

Theory and practice of chemical analysis. Statistics; gravimetric analysis; acid-base chemistry; precipitation, complexometric and redox titrations; electrochemistry; spectrophotometry; atomic absorption; emission methods; separation methods (gas/liquid chromatography).

P: Chem 212 and 214 with at least a C grade; and Chem 207 or conc enr

Spring.

**CHEM 320. Thermodynamics and Kinetics. 3 Credits.**

Temperature, heat and work, thermodynamic properties of gases, solids and solutions; homogeneous and heterogeneous equilibria; thermodynamics of electrochemical cells; statistical thermodynamics; calculation of thermodynamic properties; chemical kinetics.

P: CHEM 212 and CHEM 214 with at least a C grade; PHYSICS 104 or PHYSICS 202 with at least a C grade; and MATH 202 with at least a C grade

Fall Odd.

**CHEM 321. Structure of Matter. 3 Credits.**

Integrated approach to the concepts of physical chemistry and modern physics: introduction to quantum theory, symmetry, atomic and molecular structure, spectroscopy, X-rays, properties of gases, liquids and solids.

P: CHEM 212 and CHEM 214 with at least a C grade; and PHYSICS 104 or PHYSICS 202 with at least a C grade; and MATH 202 with at least a C grade

Spring Even.

**CHEM 322. Thermodynamics and Kinetics Laboratory. 1 Credit.**

Laboratory course to accompany Chem 320.

P: Chem 320 or conc enr; and Chem 207 or conc enr

Fall Odd.

**CHEM 323. Structure of Matter Laboratory. 1 Credit.**

Laboratory course to accompany Chem 321.

P: Chem 321 or conc enr and CHEM 207 or conc enr

Spring Even.

**CHEM 324. Biophysical Chemistry. 3 Credits.**

Biophysical Chemistry is a one-semester introductory to important physical chemistry principles and their relation to structure and energetics to biochemical structures. The course will also introduce techniques, equations related to certain phenomena, and data analysis and interpretation. The course is intended for chemistry majors declaring an emphasis in biochemistry.

P: CHEM 212 and 214 with at least a C grade and PHYSICS 104 or PHYSICS 202 with at least a C grade and MATH 202 with at least a C grade  
Fall Even.

**CHEM 325. Biophysical Chemistry Laboratory. 1 Credit.**

Laboratory course to accompany CHEM 324.

P: CHEM 324 or conc enr and CHEM 207 or conc enr  
Fall Even.

**CHEM 330. Biochemistry. 3 Credits.**

The purpose of this class is to provide students an introduction to the chemistry of living organisms, focusing on three main topics: (1) a foundation of the material required for all study of biochemistry, including an understanding of the basic chemical principles affecting life; (2) knowledge of the structure and function of biological macromolecules; and (3) the metabolic processes of energy utilization in cells. Topics covered include the nature and function of the important constituents of living matter, their biosynthesis and degradation; energy transformation, and metabolic control.

P: CHEM 303 with at least a C grade (or concurrent enrollment) and BIOLOGY 201/202 with at least a C grade.  
Fall and Spring.

**CHEM 331. Biochemistry Laboratory. 1 Credit.**

Laboratory course to accompany Chem 330.

P: CHEM 207 or conc enr; CHEM 330 or conc enr; and CHEM 305  
Fall and Spring.

**CHEM 355. Chemistry in the World. 3 Credits.**

Focuses on chemistry of modern issues: air pollution, atmospheric ozone, global warming, energy utilization, water as a natural resource, acid rain, and nuclear energy.

P: MATH 101.

**CHEM 402. Advanced Organic Chemistry. 3 Credits.**

Advanced study of the structures of organic compounds, synthetic strategies, and the mechanisms of reactions will be emphasized. Topics will include molecular orbital theory, stereochemistry, linear free energy relationships, isotope effects, and natural and pharmaceutical products, among others.

P: Chem 303 with at least a C grade  
Fall Odd.

**CHEM 403. Advanced Organic Chemistry Laboratory. 1 Credit.**

Synthesis of a natural pharmaceutical product. Learn the modern strategies and techniques involved in multi-step organic synthesis; run reactions, purify products, and use instruments to characterize products.

P: CHEM 305 with a C or better; Chem 207 with a C or better  
Fall Odd.

**CHEM 410. Inorganic Chemistry. 3 Credits.**

Survey of the elements including coordination and organometallic compounds. Modern bonding theories, group theory and periodic properties extended and applied to chemical systems and reactions. General acid-base theory and non-aqueous solvent systems.

P: Chem 212 and Chem 302 with at least a C grade; REC: Chem 303.  
Spring Odd.

**CHEM 411. Inorganic Chemistry Laboratory. 1 Credit.**

Laboratory course to accompany Chem 410.

P: CHEM 410 or conc enr and CHEM 207  
Spring Odd.

**CHEM 413. Instrumental Analysis. 4 Credits.**

Theory and practice of analysis by instrumental methods, including methods based on absorption and emission of radiation, electroanalytic methods, chromatographic methods and surface analysis methods.

P: Chem 311 with at least a C grade; and Chem 207 or conc enr. REC: Chem 303.  
Fall Only.

**CHEM 417. Nuclear Physics and Radiochemistry. 3 Credits.**

Properties and reactions of atomic nuclei; application of the properties of radioactive nuclei to the solution of chemical, physical, biological and environmental problems.

P: Chem 212 and 214 with at least a C grade and Physics 202 with at least a C grade; REC: Chem 321.  
Fall Odd.

**CHEM 420. Polymer Chemistry. 3 Credits.**

An introduction to the synthesis, characterizations, and properties of industrial polymers.

P: CHEM 300 or CHEM 303 or CHEM 321

Fall Even.

**CHEM 423. Polymer Chemistry Laboratory. 1 Credit.**

Laboratory course to accompany CHEM 420

P: CHEM 420 or concurrent enrollment AND CHEM 207 or concurrent enrollment

Fall Even.

**CHEM 478. Honors in the Major. 3 Credits.**

Honors in the Major is designed to recognize student excellence within interdisciplinary and disciplinary academic programs.

P: min 3.50 all cses req for major and min gpa 3.75 all UL cses req for major.

Fall and Spring.

**CHEM 495. Teaching Assistantship. 1-6 Credits.**

The student and supervising teacher must prepare a statement that identifies the course with which the assistantship will happen, objectives for the assistantship, and expectations in order to fulfill the course objectives. Students are not eligible to receive credit in both the course they assist the instructor with and the teaching assistantship in the same semester. Typically student has previously taken the course prior to enrollment in the assistantship. Course is repeatable for credit.

Fall and Spring.

**CHEM 496. Project/Research Assistantship. 1-6 Credits.**

The student must prepare a research proposal, and both parties should identify the research arrangement and how the student will complete the work to fulfill the course objectives within the assigned term.

Fall and Spring.

**CHEM 497. Internship. 1-12 Credits.**

Supervised practical experience in an organization or activity appropriate to a student's career and educational interests. Internships are supervised by faculty members and require periodic student/faculty meetings. Course is repeatable for credit.

Fall and Spring.

**CHEM 498. Independent Study. 1-6 Credits.**

Independent study is offered on an individual basis at the student's request and consists of a program of learning activities planned in consultation with a faculty member. A student wishing to study or conduct research in an area not represented in available scheduled courses should develop a preliminary proposal and seek the sponsorship of a faculty member. The student's advisor can direct him or her to instructors with appropriate interests. A written report or equivalent is required for evaluation, and a short title describing the program must be sent early in the semester to the registrar for entry on the student's transcript. Course is repeatable for credit.

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Fall and Spring.

**CHEM 499. Travel Course. 1-6 Credits.**

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