

CHEMISTRY (CHEM)

CHEM 2XX: Advanced Chemistry Elective

Credits: 3

College: Jefferson College of Life Sciences

Schedule Type: Lecture

CHEM 3XX: Advanced Chemistry Elective

Credits: 3

College: Jefferson College of Life Sciences

Schedule Type: Lecture

CHEM 101: General Chemistry

(for non-science majors) This course allows students to pursue further study of chemical issues as they relate to the consumer and to health. Students will become familiar with issues surrounding the use of everyday products such as laundry products, personal-care products, plastics, fibers and food additives. Also included are an introduction to organic chemistry, biochemistry and the chemistry of some health-related issues. Students should complete this course with an awareness of the complexities of the chemical structures in their daily lives and the issues involving their use and abuse, so that they may make more informed decisions.

Credits: 3

College: Jefferson College of Life Sciences

Schedule Type: Lab, Lecture, Lecture/Lab

CHEM 101L: General Chemistry I Lab

Credits: 1

College: Jefferson College of Life Sciences

Schedule Type: Lab

CHEM 103: Chemistry I

(required for Science and Engineering majors) An introduction to the fundamental laws and theories of chemistry, including the properties of matter, chemical reactions and stoichiometry, energy and thermochemistry, atomic structure, and the periodic table. Basic knowledge of algebra, geometry and trigonometry is presumed. Students enrolled in MATH-099 or MATH-100 may not take this course. This course is not recommended for students enrolled in the WRIT-100 fundamentals course.

Credits: 3

College: Jefferson College of Life Sciences

Prerequisites: MATH 100 or Math Placement (Non-Science) with a score of 10 or Math Placement (Science) with a score of 10 [Min Grade: D]

Corequisites: CHEM 103L

Schedule Type: Lecture, On-Line

CHEM 103L: Chemistry I Lab

required for Science and Engineering majors) This hands-on laboratory-based course highlights concepts covered in Chemistry I Lecture. Emphasis is placed on developing good laboratory and data analysis skills. Experiments include acid/base titrations, heat determination using calorimeters and oxidation/reduction reactions.

Credits: 1

College: Jefferson College of Life Sciences

Prerequisites: MATH 100 or Math Placement (Non-Science) with a score of 10 or Math Placement (Science) with a score of 10 [Min Grade: D]

Corequisites: CHEM 103

Schedule Type: By Appointment - 1 student, Lab, On-Line

CHEM 104: Chemistry II

(required for science majors) Continuation of CHEM 103 Chemistry I. that provides an introduction to chemical bonding and molecular geometry, property of gases, intermolecular attractions, solutions, kinetics, chemical equilibrium, acids, bases and thermodynamics.

Credits: 3

College: Jefferson College of Life Sciences

Prerequisites: (CHEM 103 or CHEM 113) and (CHEM 103L or CHEM 113L) [Min Grade: C-]

Corequisites: CHEM 104L

Schedule Type: Independent Study, Lecture, On-Line

CHEM 104L: Chemistry II Lab

(required for science majors) This hands-on laboratory-based course highlights concepts covered in Chemistry II Lecture. Analytical and data interpretation/ presentation skills are honed through a series of experiments including aspirin synthesis and determination of vitamin C content.

Credits: 1

College: Jefferson College of Life Sciences

Prerequisites: (CHEM 103 or CHEM 113) and (CHEM 103L or CHEM 113L) [Min Grade: C-]

Corequisites: CHEM 104

Schedule Type: Lab, On-Line

CHEM 105: Intro to Research Methods

Credits: 1

College: Jefferson College of Life Sciences

Schedule Type: Lecture

CHEM 113: Chemistry I

An introduction to the fundamental laws and theories of chemistry, including properties of matter, chemical reactions and stoichiometry, energy and thermochemistry, atomic structure and the periodic table.

Credits: 3

College: Jefferson College of Life Sciences

Prerequisites: MATH 100 or Math Placement (Non-Science) with a score of 10 or Math Placement (Science) with a score of 10 [Min Grade: D]

Corequisites: CHEM 113L

Schedule Type: Lecture

CHEM 113L: Chemistry I Lab

This course provides hands-on experience with topics addressed in lecture, and includes lab exercises illustrating the fundamental laws and theories of chemistry, including properties of matter, chemical reactions and stoichiometry, energy and thermochemistry, atomic structure and the periodic table. Completion of lab exercises/experiments will provide useful reinforcement of topics presented in the lecture course component and provide valuable experience with lab techniques.

Credits: 1

College: Jefferson College of Life Sciences

Corequisites: CHEM 113

Schedule Type: Lab

CHEM 114: Chemistry II

An introduction to chemical bonding and molecular geometry, intermolecular attractions, properties of solutions, kinetics, chemical equilibrium, acids, bases, buffers, and thermodynamics.

Credits: 3

College: Jefferson College of Life Sciences

Prerequisites: CHEM 113 and CHEM 113L [Min Grade: C-]

Corequisites: CHEM 114L

Schedule Type: Lecture

CHEM 114L: Chemistry II Lab

This course provides hands-on experience with topics addressed in lecture, and includes lab exercises illustrating the fundamental laws and theories of chemistry, including properties of solutions, equilibrium and kinetics in chemical reactions, and equilibrium conditions of other aqueous solutions. Completion of lab exercises/experiments will provide useful reinforcement of topics presented in the lecture course component and provide valuable experience with lab techniques.

Credits: 1**College:** Jefferson College of Life Sciences**Prerequisites:** CHEM 113 and CHEM 113L [Min Grade: C-]**Corequisites:** CHEM 114**Schedule Type:** Lab**CHEM 201: Organic Chemistry I**

First semester in a 2-semester lecture series on Organic Chemistry. Topics include origin and history of organic chemistry; chemical bonding, structure and properties of organic compounds; structure, properties and nomenclature of the alkanes; stereochemistry, and a comprehensive discussion of the substitution and elimination reactions of alkyl halides.

Credits: 3**College:** Jefferson College of Life Sciences**Prerequisites:** (CHEM 104 and CHEM 104L) or (CHEM 114 and CHEM 114L) [Min Grade: C-]**Corequisites:** CHEM 201L**Schedule Type:** Lecture, On-Line**CHEM 201L: Organic Chemistry I Lab**

First semester in a 2-semester companion course to Organic Chemistry Lecture. Topics include practical instruction in basic organic chemistry laboratory techniques such as recrystallization, distillation, extraction, reflux, thin-layer chromatography, gas chromatography, and IR spectroscopy. Utilizing these techniques, the synthesis and characteristic reactions of alkyl halides are explored.

Credits: 1**College:** Jefferson College of Life Sciences**Prerequisites:** (CHEM 104 and CHEM 104L) or (CHEM 114 and CHEM 114L) [Min Grade: C-]**Corequisites:** CHEM 201**Schedule Type:** Lab**CHEM 202: Organic Chemistry II**

Second semester in a 2-semester lecture series on Organic Chemistry. Topics include the structure, nomenclature, synthesis and characteristic reactions of alkenes, alkynes, alcohols, aldehydes, ketones & aromatic compounds.

Credits: 3**College:** Jefferson College of Life Sciences**Prerequisites:** CHEM 201 and CHEM 201L [Min Grade: C-]**Corequisites:** CHEM 202L**Schedule Type:** Lecture, On-Line**CHEM 202L: Organic Chemistry II Lab**

Second semester in a 2-semester companion course to Organic Chemistry Lecture. Utilizing techniques learned in first semester, the synthesis and characteristic reactions of alkenes, alcohols, aromatics and aldehydes/ketones are studied.

Credits: 1**College:** Jefferson College of Life Sciences**Prerequisites:** CHEM 201 and CHEM 201L [Min Grade: C-]**Corequisites:** CHEM 202**Schedule Type:** Lab**CHEM 206: Forensic Chemistry**

Students will become acquainted with the various sub-disciplines of forensic science with emphasis on the chemical principles used to collect, process, identify, quantify and qualify crime scene/victim evidence. Through lectures and case studies, the scientific foundations for the examination of physical, chemical, and biological evidence will be explored. Laboratory sessions will provide hands on experience with modern forensic techniques used to analyze physical evidence such as blood, glass, and fibers. The course will culminate with a mock trial in which students present the results of their analytical investigations to a jury.

Credits: 3**College:** Jefferson College of Life Sciences**Corequisites:** CHEM 206L**Schedule Type:** By Appointment, Lab, Lecture**CHEM 206L: Forensic Chemistry Lab****Credits:** 1**College:** Jefferson College of Life Sciences**Corequisites:** CHEM 206**Schedule Type:** Lab**CHEM 214: Bioorganic Chemistry**

This course is a one-semester overview of organic chemistry and biochemistry for PA majors and open to those who meet the prerequisites. After introduction to different functional groups, the course provides a systematic study of the biologically important compounds, including amino acids, proteins, nucleic acids, enzymes, carbohydrates and lipids. Emphasis will be placed upon the structure, properties and functions of these compounds. The course will culminate in an overarching discussion of the intricacies of metabolism of some of these biomolecules.

Credits: 3**College:** Jefferson College of Life Sciences**Prerequisites:** (CHEM 104 and CHEM 104L) or (CHEM 114 and CHEM 114L) [Min Grade: C-]**Schedule Type:** Lecture, On-Line**CHEM 304: Biochemistry****Credits:** 3**College:** Jefferson College of Health Professions**Schedule Type:** Independent Study, Lecture**CHEM 305: Physical Chemistry I**

Fundamental topics in thermodynamics are covered, emphasizing the first three laws of thermodynamics. Applications of these principles and chemical equilibrium to ideal gases, real gases, solutions and solids are discussed. Chemical kinetics is covered in detail. A brief examination of the field of chemical dynamics is included. Where appropriate, current research in these areas will be discussed. The laboratory will emphasize using chemistry techniques such as FTIR, UV-Vis, GC and computational programs to examine fundamental physical processes.

Credits: 3**College:** Jefferson College of Life Sciences**Prerequisites:** (CHEM 202 and CHEM 202L) or (PHYC 203 and PHYC 203L) and MATH 112 [Min Grade: D]**Corequisites:** CHEM 305L**Schedule Type:** Lecture, Lecture/Lab**CHEM 305L: Physical Chemistry 1 Lab****Credits:** 1**College:** Jefferson College of Life Sciences**Corequisites:** CHEM 305**Schedule Type:** By Appointment - 1 student, Lab

CHEM 306: Physical Chemistry II

Quantum mechanics is the fundamental theory underlying the description of atoms. It details how atoms can interact on the microscopic level. Quantum mechanics will be used to understand the observed spectroscopic properties of atoms and molecules. Statistical mechanics, which connects the macroscopic world of thermodynamics and kinetics with quantum mechanics, will also be covered. The laboratory is a continuation of CHEM-305 with an emphasis on spectroscopy.

Credits: 3

College: Jefferson College of Life Sciences

Prerequisites: CHEM 305 and MATH 331 [Min Grade: D]

Corequisites: CHEM 306L

Schedule Type: Lab, Lecture, Lecture/Lab

CHEM 306L: Physical Chemistry II Lab

Credits: 1

College: Jefferson College of Life Sciences

Corequisites: CHEM 306

Schedule Type: Lab

CHEM 309: Inorganic Chemistry

An advanced course in modern inorganic chemistry that covers structure and bonding, symmetry, thermodynamics and mechanisms; along with a systematic discussion of reactions and properties of representative main group and transition metal elements. This course will also illustrate some of the relationships between inorganic chemistry and other areas of chemistry, including biochemistry. The laboratory covers a variety of synthetic techniques and physical and analytical methodologies that are particularly applicable to inorganic compounds.

Credits: 3

College: Jefferson College of Life Sciences

Prerequisites: CHEM 202 and CHEM 202L [Min Grade: D]

Corequisites: CHEM 309L

Schedule Type: Lab, Lecture, Lecture/Lab

CHEM 309L: Inorganic Chemistry Lab

Credits: 1

College: Jefferson College of Life Sciences

Corequisites: CHEM 309

Schedule Type: Lab

CHEM 310: Intro to Pharmaceutical Industry

The goal of this course is to give a broad understanding of Pharmaceutical Industry and the many areas of the business. The course will cover the lifecycle overview of drug development and the organization that support each step of the lifecycle. This course will give an overview of drug development and a career in the pharma industry.

Credits: 3

College: Jefferson College of Life Sciences

Prerequisites: CHEM 202 and CHEM 202L [Min Grade: C-]

Schedule Type: Hybrid, Independent Study, Lecture

CHEM 311: Basic Pharmacology

Credits: 3

College: Jefferson College of Life Sciences

Prerequisites: (CHEM 201 and CHEM 201L) or CHEM 214 [Min Grade: C-]

Schedule Type: Lecture

CHEM 323: Instrumental Meth of Analysis

WRITING INTENSIVE: This course provides an overview of the variety of analytical and instrumental methods for quantitative and qualitative chemical analysis. Topics include gravimetric and volumetric analysis; ultraviolet, infrared, and visible spectroscopy; gas and liquid chromatography; and mass spectrometry. Laboratory sessions hone students' analytical- and critical thinking skills. Students are required to work on a group research project and present their findings at a local/regional scientific conference. [Writing Intensive]

Credits: 3

College: Jefferson College of Life Sciences

Prerequisites: CHEM 202 and CHEM 202L [Min Grade: D]

Corequisites: CHEM 323L

Schedule Type: Lab, Lecture, Lecture/Lab

CHEM 323L: Instrmntl Meth of Analysis Lab

Credits: 1

College: Jefferson College of Life Sciences

Corequisites: CHEM 323

Schedule Type: Lab

CHEM 371: Selected Topics in Chemistry

A study of a specialized topic and/or recent developments in one of the fields of chemistry. Sample topics might include theoretical organic chemistry, spectroscopy, photochemistry, stereo-chemistry and computational chemistry.

Credits: 3

College: Jefferson College of Life Sciences

Prerequisites: CHEM 202 and CHEM 202L [Min Grade: D]

Schedule Type: By Appointment - 5 students, Independent Study, Lecture

CHEM 371L: Selected Topics in Chem Lab

Credits: 1

College: Jefferson College of Life Sciences

Prerequisites: CHEM 371

Schedule Type: Lab

CHEM 391: Research in Chemistry I

Students interested in pursuing independent research in any field of chemistry or biochemistry under faculty supervision must submit a proposal to the dean of the School of Science and Health for approval at least two weeks before pre-registration. The research will include both literature search and experimental work in any current field of chemistry or biochemistry. At the end of the semester, students will be expected to do an oral presentation to the faculty during reading days and prepare a comprehensive written report as mandated by the American Chemical Society.

Credits: 3

College: Jefferson College of Life Sciences

Prerequisites: CHEM 202 and CHEM 202L [Min Grade: D]

Schedule Type: By Appointment - 1 student, By Appointment - 2 students, By Appointment - 3 students, By Appointment - 4 students, By Appointment, Independent Study

CHEM 392: Research in Chemistry II

Continuation of CHEM-391

Credits: 3

College: Jefferson College of Life Sciences

Prerequisites: CHEM 391 [Min Grade: D]

Schedule Type: By Appointment - 1 student, By Appointment - 2 students, Independent Study

CHEM 398: Chemistry Transfer Elective

Credits: 3

College: Jefferson College of Life Sciences

Schedule Type: Lecture

CHEM 405: Advanced Organic Chemistry

Credits: 3

College: Jefferson College of Life Sciences

Prerequisites: CHEM 202 and CHEM 202L [Min Grade: D]

Schedule Type: Lecture

CHEM 410: Polymer Chemistry

Credits: 3

College: Jefferson College of Life Sciences

Schedule Type: Lecture

CHEM 417: Environmental Chemistry

Credits: 3

College: Jefferson College of Life Sciences

Prerequisites: (CHEM 104 and CHEM 104L) or (CHEM 114 and CHEM 114L) and CHEM 417L [Min Grade: C-]

Schedule Type: Lab, Lecture, Lecture/Lab

CHEM 417L: Environmental Chem Lab

Credits: 1

College: Jefferson College of Life Sciences

Prerequisites: CHEM 417

Schedule Type: Lab