

CHEMISTRY (CHEM)

CHEM 101 Mystery, Mayhem, and Murder: Chemistry for the Citizen (3,4)

A survey course for students majoring in disciplines other than the natural sciences. Application of fundamental chemical principles to selected inorganic, organic, and biological systems, with particular emphasis on topics of interest to citizens in a technological society. Offered in fall or spring semester for 4 credits (Three hours lecture and one two-hour laboratory) or summer session for 3 credits (Three hours lecture, no laboratory).

CHEM 101L Mystery, Mayhem, and Murder: Chemistry for the Citizen Laboratory (0)

One two-hour laboratory per week. Corequisite: CHEM 101.

CHEM 102 Chemistry in Everyday Life (3)

This course seeks to make the Saint Mary's College student aware of the chemicals that affect her directly as she lives her daily life. (Three lecture hours per week).

CHEM 103 FYS: Power Up: Understanding Energy in Everyday Life (3)

Energy drives everything we do, from charging our phones to fueling global economies. This course explores the fascinating world of energy in ways that are accessible and engaging for non-science majors. We'll unravel the mysteries of how energy is produced, consumed, and impacts our planet. Through real-world examples, we'll investigate topics like biological energy, renewable energy, batteries, climate change, and the ethical dimensions of energy use in society. Students will also reflect on their personal energy consumption and explore how individual choices contribute to larger societal trends. By the end of the course, students will be equipped to think critically about energy issues and their role in shaping a sustainable future. No prior science background is required—just curiosity and a willingness to explore the forces that power our modern lives.

CHEM 104 Pop Culture Chemistry (3)

Through this course, you will be exposed to examples of chemistry in different popular culture mediums, including books, movies, television shows, the internet, and social media. Through investigation of the accuracy and validity of the science, you will learn principles of chemistry and biochemistry and will learn how to critique depictions of science in the media. In addition, this course will explore how real-world applications of chemistry influence pop culture and vice-versa. This course is for students majoring in non-science disciplines which fulfills the Natural Science (no lab) general education requirement.

CHEM 105 The Principles, Promise, and Perils of Artificial Intelligence (3)

What is AI? How does it "learn" from data? Where does the data come from? How do artificial intelligence and human intelligence differ? What are the ethical implications of artificial intelligence? What is the environmental impact of artificial intelligence? Throughout this one-semester introduction to the principles, promises, and perils of artificial intelligence, we will introduce the concepts and tools necessary to investigate and explore such questions. Specifically, we will delve into the history of computers and machine intelligence; learn how to read and utilize a machine learning algorithm; explore natural language processing algorithms such as ChatGPT; and investigate the ethical concerns regarding the training, utilization, and energy needs of artificial intelligence. We will also utilize artificial intelligence as a tool to help with brainstorming, outlining, and gathering references for a thesis-driven essay.

CHEM 118 Integrated General, Organic and Bio-Chemistry (4)

An introduction to the fundamental concepts of general chemistry, organic chemistry and biochemistry with applications to the field of nursing. Laboratory experiments will closely correspond with the lecture material. (Four hours lecture and one two-hour laboratory) Prerequisite: One year high school chemistry and MATH 102 or concurrent enrollment in any higher level math course; or permission of the instructor.

CHEM 118L Integrated General, Organic and Bio-Chemistry Laboratory (0)

One two-hour laboratory per week. Corequisite: CHEM 118.

CHEM 121 Principles of Chemistry I (4)

This course is an introduction to chemical stoichiometry, atomic and molecular structure, and bonding. Laboratory will explore principles presented in lecture. (Three-hour lecture and one three-hour laboratory). Prerequisite: high school chemistry or permission of the instructor; students must be calculus-ready. For biology, chemistry, physics, and engineering intended majors. This course also satisfies the LO2 Critical Thinking Seminar.

CHEM 121L Principles of Chemistry I Laboratory (0)

One three-hour laboratory per week. Corequisite: CHEM 121.

CHEM 122 Principles of Chemistry II (4)

An introduction to chemical energetics, chemical equilibria, acid-base chemistry, and kinetics. Laboratory will explore principles presented in lecture. (Three hours lecture and one three-hour laboratory) Prerequisite: CHEM 121 or permission of instructor.

CHEM 122L Principles of Chemistry II Laboratory (0)

One three-hour laboratory per week. Corequisite: CHEM 122.

CHEM 221 Organic Chemistry I (3)

An introduction to the theory and practice of organic chemistry. The course focuses on the foundational principles of organic chemistry, including properties, structure, nomenclature, and structural analysis of organic compounds. Reactions of alkenes, alkyl halides, and aromatic compounds are studied in depth with building a foundation of synthesis strategies. (Three hours lecture per week) Prerequisite: CHEM 122.

CHEM 221L Organic Chemistry I Laboratory (1)

A course in a variety of organic laboratory skills, including separation and purification techniques. One three hour lab per week. Corequisite: CHEM 221.

CHEM 222 Organic Chemistry II (3)

A continuation of organic chemistry I (CHEM 221), with a focus on the study of reactions and synthesis of alcohols and carbonyl compounds. Radical and cycloaddition reactions are discussed in addition to varied topics in modern organic chemistry with a focus on synthesis. (Three hours lecture per week) Prerequisite: CHEM 221.

CHEM 222L Organic Chemistry II Laboratory (1)

A course in organic chemistry laboratory skills, including emphasizing qualitative analysis using chemical and instrumental methods. One three hour lab per week. Corequisite: CHEM 222.

CHEM 311 Thermodynamics (3)

A detailed study of thermodynamics, statistical mechanics, and kinetics. This calculus-based course integrates concepts of chemistry and physics. Three hours lecture. Prerequisites: CHEM 122, PHYS 122; Recommended: CHEM 221.

CHEM 312 Quantum Chemistry (3)

A detailed study of quantum chemistry, including techniques and applications of quantum theory, atomic and molecular structure, bonding, symmetry, group theory, and spectroscopy. (Three hours lecture)
Prerequisites: CHEM 122, PHYS 122. Recommended: CHEM 221, 231.

CHEM 324 Biochemistry (3)

A study of the chemical reactions of cells, the major metabolic pathways, and the interrelationship of these pathways. (Three hours lecture per week) Prerequisites: CHEM 222.

CHEM 332 Analytical Chemistry (3)

Quantitative methods of analysis are explored. The theory and application of wet chemical techniques and modern instrumental techniques (spectroscopy, chromatography and electrochemistry) are introduced with a focus on method selection and underlying chemical concepts. Analytical chemistry uses of statistics and equilibrium are also discussed. (Three hours lecture per week). Prerequisites: CHEM 221.

CHEM 342 Bio-Inorganic Chemistry (3)

This course explores the properties and bonding of inorganic elements that are important to biological systems and biologically-inspired inorganic materials. Students will apply chemical principles in understanding the endogenous roles of metals in charge balance, catalysis, and structure. Students will learn how inorganic chemists design metal-based drugs and imaging agents to solve problems in human health, and how reverse-engineering of bio-inorganic systems have led to revolutionary inorganic solid state- and nano-materials. (Three hours lecture per week) Prerequisite: CHEM 222.

CHEM 361 Advanced Laboratory I (4)

Laboratory methods in chemistry are explored. Students will learn how to design and conduct experiments and gain hands-on experience with various laboratory techniques within the overall context of answering chemical questions. They will learn the basic chemical and physical principles upon which these varied techniques are based, plus they will demonstrate and apply their overall chemical knowledge from their first through third years of courses and laboratories. Students will also learn scientific presentation and writing skills. (Two 4-hour laboratories per week). Prerequisites: CHEM 222 and CHEM 222L.

CHEM 362 Advanced Laboratory II (4)

A continuation of CHEM 361, students will explore more advanced laboratory techniques, building upon their experience of the previous course. Students will also build their scientific writing and presentation skills. (Two 4-hour laboratories per week). Prerequisite: CHEM 361.

CHEM 424 Advanced Biochemistry (3)

Advanced topics in the chemistry and chemical mechanisms involved in intermediary metabolism and developmental processes with consideration of the biochemistry current in the literature. (Three hours lecture per week). Prerequisites: CHEM 324, CHEM 311, or permission of instructor.

CHEM 431 Advanced Inorganic Chemistry (3)

A study of modern inorganic chemistry with emphasis on the principles, properties, and chemical trends of coordination compounds, This course will also explore the essentials of structure, bonding, symmetry, spectroscopy, and reactivity. (Three hours lecture per week). Prerequisite: CHEM 342.

CHEM 485 Research (1-3)

Participation in original experimental or theoretical investigation in collaboration with a member of the faculty. Prerequisite: Permission of the instructor. May be repeated.

CHEM 490 Topics in Chemistry (2,3)

Topics in Chemistry not covered in the regular department offerings and selected according to the interests of the students and instructor. Offered according to student demand. (Two or three lectures per week) Prerequisite: Permission of the instructor. May be repeated for credit with a different topic.

CHEM 495 Senior Seminar (1)

A professional development course for Chemistry and Physics majors. The course will cover various topics with a focus on writing, presentation and critical thinking skills as used in the physical sciences

CHEM 497 Independent Study (1-2)

Topics in Chemistry not covered in the regular department offerings and selected according to the interests of the students and instructor. Offered according to student demand. (Two or three lectures per week) Prerequisite: Permission of the instructor. May be repeated for credit with a different topic.

CHEM 499 Chemistry Internship (1-4)

Experience in a chemistry internship. Graded S/U. May be repeated. Prerequisites: Permission of department required.