

CHEMISTRY (CHEM)

CHEM 117 - Principles of Chemistry, 4 credits.

No Laboratory. Stoichiometry, atomic structure, thermochemistry and chemical reactions. Emphasis on developing problem solving skills and mathematical ability. Students who do not feel comfortable with their chemistry preparation should consider this course which tracks with Chemistry 127 at approximately 2/3 the pace. This course does not satisfy the science core requirement nor satisfy chemistry prerequisites of most health professions schools.

Frequency: *Every Year - First Semester*

CHEM 127 - General Chemistry I, 4 credits.

First college course in chemistry for most students. Topics include: stoichiometry; states of matter; periodicity; nomenclature; atomic structure; geometry of molecules; chemical bonding; thermochemistry; chemical reactions; and related consumer, environmental and industrial problems. Three class periods and three hours of laboratory per week. Prerequisite: high school chemistry. This course can also count toward the environmental and sustainability studies program.

Frequency: *Every Semester*

Core designations: Natural Science N

CHEM 128 - General Chemistry II, 4 credits.

Further study in general chemistry. Topics include redox chemistry, thermodynamics, chemistry of solutions, chemical kinetics, chemical equilibrium, buffer solutions and electrochemistry. Three class periods and three hours of laboratory per week. This course can also count toward the environmental and sustainability studies program.

Frequency: *Every Semester*

Prerequisites: CHEM 127

Core designations: Natural Science N

CHEM 142 - Survey of Organic and Biochemistry, 4 credits.

A survey of organic and biological chemistry. This course is intended for students in nursing, nutrition and other related health professions. It does not count toward a chemistry major or minor. Three class periods and three hours of laboratory per week. Prerequisite: high school chemistry

Frequency: *Every Year - Second Semester*

CHEM 152 / BIOL 152 - Vocation and the Health Professions, 1 credits.

Intended for freshmen and sophomore students interested in various careers in the health professions. This course offers a balance of personal reflection and practical information. The concept of "vocation as calling" will be emphasized and students will be asked to reflect upon their reasons for choosing a particular career path. Practical information will include various career options in the health professions, undergraduate expectations, professional school admissions requirements, and non-traditional career paths.

Frequency: *Every Year - Second Semester*

CHEM 330 - Analytical Chemistry I, 4 credits.

An overview of the fundamentals of chemical analysis. Topics include statistics and sampling, chemical equilibrium, volumetric analysis, electrochemistry, and an introduction to instrumentation. Laboratory work emphasizes representative sampling, sample preparation, volumetric analysis, gas and liquid chromatography, atomic and molecular spectroscopy, data analysis, and scientific writing. Three class periods and four hours of laboratory per week.

Frequency: *Every Year - Second Semester*

Prerequisites: CHEM 128

Core designations: Natural Science N

CHEM 341 - Organic Chemistry I, 4 credits.

An examination of the fundamental classes of carbon compounds and the relationship of their physical and chemical properties to structure. Three class periods and one three-hour laboratory per week.

Frequency: *Every Year - First Semester*

Prerequisites: CHEM 128

Core designations: Natural Science N

CHEM 342 - Organic Chemistry II, 4 credits.

A study of organic compounds containing oxygen, nitrogen and sulfur, including many of commercial and/or biochemical importance. Three class periods and one three-hour laboratory per week.

Frequency: *Every Year - Second Semester*

Prerequisites: CHEM 341

Core designations: Natural Science N

CHEM 344 - Spectroscopy, 4 credits.

This course provides detailed exposure to the theory and application of the four fundamental molecular spectroscopies (nuclear magnetic resonance, infrared, ultraviolet, and mass spectrometry). Focus is placed upon spectra interpretation toward molecular structure elucidation. Practical, hands-on experience with each instrument is highlighted. Three class periods per week.

Frequency: *Alternate Years - 2nd Semester*

Prerequisites: CHEM 341

CHEM 351 - Physical Chemistry I, 4 credits.

The first of two courses that explore the fundamental physical principles of chemistry. The course progresses from a microscopic to a macroscopic point of view moving from quantum mechanics to statistical mechanics and finally to thermodynamics. Topics include one-dimensional quantum models, atoms and molecules, the Boltzmann distribution, the laws of thermodynamics, chemical equilibrium, and electrochemistry. Three class periods and one four-hour laboratory per week.

Frequency: *Every Year - First Semester*

Prerequisites: MATH 121 and CHEM 128

Core designations: Natural Science N

CHEM 352 - Physical Chemistry II, 4 credits.

The second of two courses that explores the fundamental physical principles of chemistry. The course builds on the fundamentals of quantum mechanics, statistical mechanics, and thermodynamics introduced in CHEM 351 - Physical Chemistry I. Additionally, physical and chemical kinetics are discussed. Topics include: two and three dimensional quantum models, operator formalism, angular momentum, group theory, lasers, kinetics, and thermodynamics of solutions. Three class periods per week.

Frequency: *Every Year - Second Semester*

Prerequisites: CHEM 351

CHEM 373 - Biochemistry I, 4 credits.

A survey of the chemistry and biology of the fundamental molecules of life: carbohydrates, lipids, nucleic acids, amino acids, proteins, enzymes, vitamins and cofactors. The metabolic pathways for producing energy by degradation of carbohydrates, lipids and proteins are also a major component of the course. Three class periods plus one three-hour lab per week.

Frequency: *Every Year - First Semester*

Prerequisites: CHEM 342

Core designations: Natural Science N

CHEM 374 - Biochemistry II, 4 credits.

Building on the content of Biochemistry I, this course surveys selected biochemical pathways for synthesizing the molecules of life such as fatty acids, triglycerides, cholesterol, heme, starch and glycogen. A second major focus of the course is the transfer of biological information as it flows from DNA to RNA to proteins. Three class periods plus one three-hour lab per week.

Frequency: Every Year - Second Semester

Prerequisites: CHEM 373

Core designations: Natural Science N

CHEM 380 - Special Topics, 0-4 credits.

Courses covering various topics of interest in this particular discipline are offered regularly. Contact department or program chair for more information.

Frequency: Not offered on a Regular Basis

Repeatable: Yes

CHEM 390 - Academic Internship, 1-8 credits.

Frequency: Not offered on a Regular Basis

Repeatable: Yes

CHEM 397 - ACS Research, 0 credits.

This course documents successful completion of the chemistry research requirement for all American Chemical Society (ACS) degrees. This requirement includes at least 84 hours of directed research, as well as completion of a research paper. Prerequisite: permission of instructor.

Frequency: Every Semester

Repeatable: Yes

CHEM 398 - ACS Research, 0 credits.

This course documents successful completion of the chemistry research requirement for all American Chemical Society (ACS) degrees. This requirement includes at least 126 hours of directed research, as well as completion of a research paper. Prerequisite: permission of instructor.

Frequency: Every Semester

CHEM 403 - Senior Seminar I, 1 credits.

The first in a two-course sequence (Chem 403/404) focusing on the preparation and presentation of a major paper related to the field of chemistry. Chem 403 emphasis is on the fundamentals of conducting research for the paper, writing the paper, and giving the presentation. Additional topics include scientific ethics and career preparation. May be required for completion of PEAK project in Chemistry Department.

Frequency: Every Year - First Semester

This course is PEAK Optional

CHEM 404 - Senior Seminar II, 1 credits.

Oral and written presentation of a topic of interest to the chemistry department. The student works with a chosen faculty mentor to apply the skills learned in CHEM 403 - Senior Seminar I.

Frequency: Every Year - Second Semester

Prerequisites: CHEM 403 (may be taken concurrently)

CHEM 431 - Analytical Chemistry II, 4 credits.

A continuation of the topics introduced in CHEM 330, with an emphasis on instrumental methods of chemical analysis. In addition to the instrumental techniques introduced in the previous course, this course includes computer-to-instrument interfaces, electronics, electrochemical techniques, capillary electrophoresis, mass spectrometry, and surface analysis methods. One class period and six hours of laboratory per week.

Frequency: Every Year - First Semester

Prerequisites: CHEM 330

Core designations: Natural Science N

CHEM 445 - Organic Chemistry III, 4 credits.

A study of modern concepts of organic reaction mechanisms and the relationship of spectroscopic properties to molecular structure. Three class periods and one four-hour laboratory per week.

Frequency: Not offered on a Regular Basis

Prerequisites: CHEM 342

CHEM 462 - Advanced Inorganic Chemistry, 4 credits.

A study of theoretical inorganic chemistry at an advanced level. The primary concerns are with modern concepts of bonding, coordination chemistry, acid-base behavior, reaction mechanisms and properties of less familiar elements. Three class periods.

Frequency: Every Year - Second Semester

Prerequisites: CHEM 351

CHEM 475 / NEU 475 - Neurochemistry, 4 credits.

This junior/senior level course studies the chemical and biochemical aspect of neuroscience including ligand binding, pharmacokinetics and second messenger cascades. Three class periods per week.

Frequency: Every Year - Second Semester

Prerequisites: (NEU 109 and CHEM 142) or CHEM 373

CHEM 480 - Independent Study, 1-4 credits.

This course provides an opportunity for individual students to conduct in-depth study of a particular topic under the supervision of a faculty member. Contact the department or program chair for more information.

Frequency: Not offered on a Regular Basis

Repeatable: Yes

CHEM 487 - Directed Research, 1-4 credits.

This course provides an opportunity for individual students to conduct research in a specific area of study, completed under the direction of a faculty mentor. Specific expectations of the research experience to be determined by the faculty. Repeatable for credit. Prerequisite: consent of instructor.

Frequency: Not offered on a Regular Basis

Repeatable: Yes