

CHEMISTRY (CHEM)

CHEM 100 Our Chemical Environment 2.00

Introduces the concepts of chemistry into the interpretation of chemical effects on the environment. Prerequisite: None. Meets the University Studies requirement for Natural Science (environmental component). Credits cannot be counted toward a Chemistry major or minor. Offered both on campus and online.

University Studies Requirements:

- Natural Sciences - Environmental

Typically Offered:

- On-campus: Select Semesters;

CHEM 102 Chemistry of Everyday Phenomena 4.00

Explores the chemistry of foods, drugs, household chemicals, personal hygiene products, agricultural chemicals, materials and other types of chemistry relevant to the student. Current chemistry topics in the popular press will be critically examined. Topics not usually addressed in other science general education courses will be presented. A small part of the course will be devoted to elementary statistics (evaluation, not calculation) to enable students to understand science and medicine as it is commonly reported. An important but minor part of the course involves discussion of the role of research in technology development and standard of living, and the impact of the chemical industry on the national and world economies. Credits cannot be counted toward a Chemistry major or minor. Prerequisite: None. (Three lectures and one two-hour laboratory.)

University Studies Requirements:

- UST: Natural Sciences - Lab

Typically Offered:

- On-Campus: Fall;

CHEM 105 General Chemistry I 5.00

Introduction to physical and chemical properties of the elements, chemical reactions, gas laws, chemical nomenclature, structure of atoms, chemical bonding, and solutions. Intermediate algebra (MATH 113) or equivalent strongly recommended as prerequisite. (Four lectures and one three-hour laboratory.)

University Studies Requirements:

- UST: Natural Sciences - Lab

Typically Offered:

- On-Campus: Fall;

CHEM 106 General Chemistry II 4.00

Continuation of CHEM 105 studying chemical equilibria, kinetics, electrochemistry, chemical compounds and reactions, qualitative analysis of ions, organic chemistry and nuclear chemistry. Three lectures and one three-hour laboratory.

Prerequisites:

CHEM 105 and one of MATH 113, 115, 151 or 240.

Typically Offered:

- On-campus: Spring;

CHEM 107 Supplementary Problems in General Chemistry II 1.00

A course designed to expand and provide extra help on those topics in General Chemistry II which frequently cause difficulty for the less well prepared student. Can only be taken simultaneously with General Chemistry II (CHEM 106). Credits cannot be applied to Chemistry Major or Minor. One Lecture-recitation per week.

Prerequisites:

CHEM 106 is co-requisite.

Typically Offered:

- On-campus: Spring;

CHEM 181 Introductory Topics 1.00-2.00

Introductory studies of special interest selected by a student and/or faculty member. The course may be independent-study, and it may be either lecture, laboratory, or both. The study most commonly will be introductory laboratory research work by a student considering a chemistry major, but also may be used for other special studies by a highly prepared student in chemistry. Pre- or corequisite: varies with topic and permission of instructor. Individual sections of the course may be offered for a grade or may be offered pass-fail only. May be repeated for a maximum of two credits. Offered upon sufficient demand.

Typically Offered:

- On-campus: Select Semesters
- Online: Select Semesters

CHEM 189 Chemistry Elective 1.00-12.00

Transfer credits ONLY from another accredited institution not equivalent to a UW-Superior course.

CHEM 281 Selected Topics 1.00

Individual studies of a special interest selected by a student and/or faculty member. The study may involve seminars, special laboratory study. Prerequisites: varies with topic and consent of instructor. (May be repeated for up to two credits.) Offered on sufficient demand.

Typically Offered:

- On-campus: Select Semesters
- Online: Select Semesters

CHEM 289 Chemistry Elective 1.00-9.00

Transfer credits ONLY from another accredited institution not equivalent to a UW-Superior course.

CHEM 289ES Chemistry Elective Environmental Science 1.00-12.00

Transfer credits ONLY from another accredited institution not equivalent to a UW-Superior course.

CHEM 289LS Chemistry Elective Lab Science 1.00-12.00

Transfer credits ONLY from another accredited institution not equivalent to a UW-Superior course.

CHEM 300 Chemistry of Natural Waters 3.00

Emphasizes experimental methods used in investigations of the chemistry of natural water systems and the interpretation of chemical parameters indicative of water quality. (Two lectures and one three-hour laboratory.)

Prerequisites:

CHEM 105 and either BIOL 330 or BIOL 340.

Typically Offered:

- On-campus: Fall, Odd Years;

CHEM 305 Quant Analysis Lecture 3.00

Introductory lecture course in quantitative chemical analysis with major emphasis on classical, wet chemical methods and chemical equilibria. Topics include: concentration calculations, chemical reaction stoichiometry, equivalent weights and normality, titrimetric and gravimetric determinations, acid-base theory, solubilities and precipitation separations, basic electrochemistry, potentiometry, introduction to uv-visible absorbance spectrophotometry. (Three lectures.)

Prerequisites:

Prerequisite for taking this course is completion of CHEM 106, and corequisite is CHEM 306.

Typically Offered:

- On-campus: Fall, Even Years;

CHEM 306 Quantitative Analysis Laboratory 2.00

Introductory laboratory course emphasizing wet chemical methods of quantitative analysis. Representative experiments include titrimetry and basic instrumental determinations. Applications of statistics to data analysis are discussed and applied. (One four-hour lecture/laboratory.)

Prerequisites:

CHEM 305 is corequisite for taking this course.

Typically Offered:

- On-campus: Fall, Even Years;

CHEM 312 Organic Chemistry--A Short Course 3.00

One-semester survey in organic chemistry covering material which describes the structure, properties, preparation and reactions of the major classes of organic compounds. Additional topics will be selected from chemical bonding, kinetics, mechanisms and spectroscopy. Does not count toward a chemistry liberal education major. Counts toward a chemistry secondary education major. (Three lectures.)

Prerequisites:

CHEM 106 is prerequisite and CHEM 313 is co-requisite.

Typically Offered:

- On-campus: Select Semesters
- Online: Select Semesters

CHEM 313 Intro Organic Chem Lab 2.00

One-semester laboratory designed to accompany CHEM 312. Work consists of laboratory preparation and study of the chemical and physical properties of compounds of the types covered in CHEM 312. Co-requisite: CHEM 312. Does not count toward chemistry liberal arts major. Counts toward a chemistry secondary education major. (One-hour lecture-demonstration and one three-hour laboratory.)

Prerequisites:

CHEM 312 is co-requisite.

Typically Offered:

- On-campus: Select Semesters
- Online: Select Semesters

CHEM 320 Organic Chemistry Lecture I 3.00

First of a two-semester sequence of courses which make up a standard one-year course in beginning organic chemistry. Study of the structures, properties, preparation and reactions of the major classes of organic compounds. Also includes basic principles of chemical bonding, kinetics, mechanisms and molecular spectroscopy. (Three lectures.)

Prerequisites:

CHEM 106 is prerequisite; CHEM 322 AND CHEM 327 are co-requisites.

Typically Offered:

- On-Campus: Fall;

CHEM 321 Organic Chem Lecture II 3.00

Second of a two-semester sequence of courses which make up a standard one-year course in beginning organic chemistry. Work is made up of the study of the structures, properties, preparation and reactions of the major classes of organic compounds. Also includes basic principles of chemical bonding, kinetics, mechanisms and molecular spectroscopy. (Three lectures.)

Prerequisites:

CHEM 320 is prerequisite; CHEM 323 is co-requisite.

Typically Offered:

- On-campus: Spring;

CHEM 322 Organic Chemistry Lab I 1.00

First of a two-semester sequence of laboratory courses which accompany CHEM 320 and 321. Consists of laboratory preparation and study of the chemical and physical properties of compounds of the types covered in CHEM 320-321. Some applications of molecular spectroscopy. (Three-hour laboratory)

Prerequisites:

CHEM 320 AND CHEM 327 are co-requisites.

Typically Offered:

- On-Campus: Fall;

CHEM 323 Organic Chemistry Lab II 1.00

Second of a two-semester sequence of laboratory courses which accompany CHEM 320 and 321. Consists of laboratory preparation and study of the chemical and physical properties of compounds of the types covered in CHEM 320-321. Some applications of molecular spectroscopy. (Three-hour laboratory.)

Prerequisites:

CHEM 321 is co-requisite.

Typically Offered:

- On-campus: Spring;

CHEM 327 Molecular Spectroscopy I 1.00

Elementary introduction to the spectroscopic techniques most frequently used by chemists. Brief summaries of the mechanics of the techniques will be given, but major focus is interpretation of spectra generated by the following techniques: mass spectroscopy, infrared spectroscopy, proton and carbon nuclear magnetic resonance spectroscopy, and ultraviolet spectroscopy. Students will be expected to identify and sketch structures of simple organic compounds based on spectral interpretation. (One lecture.)

Prerequisites:

CHEM 320 is a corequisite for this class

Typically Offered:

- On-Campus: Fall;

CHEM 341 Introductory Physical Chemistry 3.00

Provides foundations for major area of Physical Chemistry including thermodynamics, chemical kinetics quantum theory, chemical bonding, molecular rotations and vibrations, electronic transitions, photochemistry, and molecular interactions.

Prerequisites:

MATH 115 and PHYSICS 108 or 202, or consent of instructor

Typically Offered:

- On-campus: Spring;

CHEM 345 Physical Chemistry Lect I 4.00

Exposes students to the main principles of modern thermodynamics and chemical kinetics and their applications. Key points of both areas will be illustrated with the examples of thermodynamics of polymer blends and the effect of formation of meta-stable states in polymer thin films. (Four lectures.)

Prerequisites:

CHEM 106, MATH 241, PHYS 202 or PHYS 206, OR permission of instructor are prerequisites.

Typically Offered:

- On-campus: Spring;

CHEM 346 Physical Chemistry Lecture II 3.00

Continuation of CHEM 345 emphasizing quantum theory, lasers, spectroscopy, molecular transport, and molecular reaction dynamics. Key points of many of these areas will be illustrated with the phenomenon of surface light-induced drift. (Three lectures.)

Prerequisites:

CHEM 345 or permission of instructor. CHEM 348 is co-requisite.

Typically Offered:

- On-campus: Select Semesters;

CHEM 347 Physical Chemistry Lab I 1.00

Laboratory work studies laser photochemistry and other applications of lasers in chemistry, as well as thermodynamical properties of gases and liquids, and calorimetry. (One four-hour laboratory meeting during the last eight weeks of the semester.)

Prerequisites:

CHEM 345 is co-requisite.

Typically Offered:

- On-campus: Select Semesters;

CHEM 348 Physical Chemistry Lab II 2.00

Continuation of CHEM 347 consisting of laboratory studies of the applications of lasers in chemistry, including kinetic measurements, thermodynamical properties of liquids and macromolecules, electrochemistry, and spectroscopy. (One four-hour laboratory.)

Prerequisites:

CHEM 346 is a co-requisite.

Typically Offered:

- On-campus: Select Semesters;

CHEM 360 Introduction to Biochemistry 3.00

One-semester survey of principles of biological chemistry. Study of the principal compounds of biochemical importance: proteins, lipids, carbohydrates, their chemistry, metabolic breakdown and biosynthesis, enzymes, co-factors, nucleic acids, regulation of cellular systems. Three lectures.

Prerequisites:

CHEM 312 or CHEM 321 are prerequisite.

Typically Offered:

- On-Campus: Fall;

CHEM 365 Descriptive Inorganic Chemistry 3.00

Survey of the basic chemistry of most elements of the periodic table, including natural abundances, typical compounds in the natural state, purification techniques, and modern uses. Periodic trends will be explored and used as an organizing tool in understanding this chemistry. Includes topics such as crystal packing and ionic structures of solids, acid-base theory, and redox reactions.

Prerequisites:

CHEM 106 and CHEM 312 or CHEM 320.

Typically Offered:

- On-Campus: Fall;

CHEM 375 Instrumental Analysis Lecture 3.00

Survey of chemical instrumentation and instrumental methods of analysis. Instrumental methods discussed include: atomic and molecular spectroscopy and spectrometry, chromatography, potentiometry, and voltammetry. Discussion also includes: detection limits and detectability, sensitivity, and methods of data analysis. (Three lectures.)

Prerequisites:

CHEM 305 is prerequisite. CHEM 376 is co-requisite.

Typically Offered:

- On-campus: Select Semesters;

CHEM 376 Instrumental Analysis Lab 2.00

Representative experiments in many of the analytical methods discussed in CHEM 375. Some experiments involve digital data acquisition. Computerized methods of data analysis are employed. (One four-hour laboratory.)

Prerequisites:

CHEM 375 is co-requisite.

Typically Offered:

- On-campus: Select Semesters;

CHEM 381 Intermediate Topics 1.00-3.00

May be offered for individualized or multiple-student instruction on a particular topic. May be independent study, lecture or laboratory. Topic(s) selected based upon student interest with approval of instructor. Prerequisites: varies with topic. Introductory Physical Chemistry is currently offered as an Intermediate Topic on a regular basis.

Typically Offered:

- On-campus: Select Semesters
- Online: Select Semesters

CHEM 389 Chemistry Elective 1.00-12.00

Transfer credits ONLY from another accredited institution not equivalent to a UW-Superior course.

CHEM 462 Advanced Biochemistry 3.00

Second semester of a year sequence involving a study of the chemistry of living systems. Takes a more in-depth look at principles covered in the first semester: structure and properties of amino acids and proteins, enzymes, carbohydrate and lipid metabolism and nucleic acids, and covers additional topics including enzyme mechanisms, vitamins and co-factors, protein metabolism and bioenergetics.

Prerequisites:

CHEM 321 and CHEM 360 are prerequisite.

Typically Offered:

- On-campus: Spring, Even Years;

CHEM 465 Laboratory Techniques in Biochemistry and Cell/Molecular Biology 1.00-2.00

Principles and practices of techniques used in biochemistry and in cell and molecular biology. Includes protein isolation and analysis, enzyme kinetics, carbohydrate analysis, immunological techniques for analysis, and techniques of gene cloning and manipulation. Recommended: CHEM 462, BIOL 355 AND BIOL 440 or concurrent enrollment. (Lecture one hour, laboratory three hours) Cross-listed as: BIOL/CHEM 465.

Typically Offered:

- Spring Term Even Years Only

CHEM 481 Special Topics 1.00-6.00

In-depth study of specialized current topics in chemistry selected by the faculty on the basis of student/community interest. May include workshops, seminars, field trips, special problems, independent study. May be repeated when topics are different. Prerequisite: varies with topic.

Typically Offered:

- On-campus: Select Semesters
- Online: Select Semesters

CHEM 489 Chemistry Elective 1.00-9.00

Transfer credits ONLY from another accredited institution not equivalent to a UW-Superior course.

CHEM 489ES Chemistry Elective Environmental Science 1.00-12.00

Transfer credits ONLY from another accredited institution not equivalent to a UW-Superior course.

CHEM 489LS Chemistry Elective Lab Science 1.00-12.00

Transfer credits ONLY from another accredited institution not equivalent to a UW-Superior course.

CHEM 491 Senior Research 1.00-4.00

Individual laboratory investigation of a selected problem to include a study of the related literature and formal reports. Prerequisites: CHEM 346 and approval of instructor. (May be repeated for up to four credits.)

Typically Offered:

- On-campus: Fall & Spring;

CHEM 496 Senior Paper 1.00

Preparation of a formal paper on an advanced chemistry topic. Topic must be approved by instructor. Instructor consent required. Topic chosen for CHEM 496 may not be appropriate for CHEM 497. Consult instructor of CHEM 497. Prerequisite or corequisite: CHEM 345.

Typically Offered:

- On-campus: Fall & Spring;

CHEM 497 Senior Seminar In Chemistry 1.00

Each student prepares and gives one or more oral reports on a chemical topic of interest to the student and approved by instructor. Prerequisites: CHEM 345 or senior standing in Chemistry. One lecture-discussion. Does not count toward 400-level credits for ACS certification.

Typically Offered:

- On-campus: Fall & Spring;

CHEM 498 Internship 1.00-4.00

A chemistry-related work experience with an industry, business or other organization (e.g. LSRI, LSNERR) that provides students with opportunities to apply their learned skills to practical problems. In collaboration with a faculty sponsor, students must complete a Contract for Independent Learning prior to registration. May be used to satisfy Senior Year Experience requirements.

Prerequisites:

Pre-requisite: CHEM 305 and CHEM 321

Typically Offered:

- On-campus: Fall, Spring, & Sum;