

CHEMISTRY (CH) (CH)

CH 101 Survey of Inorg and Org Chem 3 cr

An intensive presentation of inorganic and organic chemistry principles selected to convey a basic understanding of their relationship to and function in the life process. Laboratory exercises will introduce students to basic laboratory procedures, often using exercises related to life process. This course is generally taken by students in the College of Nursing. CH 101L must be taken concurrently. Together, CH 101 and CH 101L count as one laboratory science course, partially fulfilling general education requirements. (Offered Fall and Spring Semesters.) Core Course.

Corequisite: CH 101L

CH 101L Survey Inorg-Org Chem Lab 1 cr

Laboratory exercises associated with CH 101. CH 101 must be taken concurrently or as a prerequisite. Together, CH 101 and CH 101L count as one laboratory science course, partially fulfilling general education requirements. Core Course.

Corequisite: CH 101

CH 131 General Chemistry I 3 cr

Three lecture hours and one recitation hour per week for one semester. First of a two-semester sequence for majors, minors, and others seeking quantitative treatment. Topics include the nuclear model, stoichiometry, chemical reactions, gas laws, thermochemistry, atomic structure, and molecular bonding. Together, CH 131 and CH 131L count as one laboratory science course partially fulfilling general education requirements. (Offered Fall and Spring Semesters.) Core Course.

Prerequisite: CH 100 Minimum Grade of D or CH 110 Minimum Grade of D or ACT Math 24 or SAT Mathematics 560 or MATH SECTION SCORE 580 or MA 112 Minimum Grade of C or MA 113 Minimum Grade of C or MA 172 Minimum Grade of C or MA 115 Minimum Grade of C or MA 121 Minimum Grade of C or MA 120 Minimum Grade of C or MA 287 Minimum Grade of C or MA 125 Minimum Grade of C or MA 132 Minimum Grade of C or MA 126 Minimum Grade of C or MA 233 Minimum Grade of C or MyMathTest 080 or University test - Math 85

CH 131L General Chemistry I Lab 1 cr

Laboratory exercises associated with CH 131. CH 131 and CH 131L must be taken concurrently. Together, CH 131 and CH 131L count as one laboratory science course, partially fulfilling general education requirements. Core course.

Prerequisite: CH 100 Minimum Grade of D or CH 110 Minimum Grade of D or ACT Math 24 or SAT Mathematics 560 or MATH SECTION SCORE 580 or MA 112 Minimum Grade of C or MA 113 Minimum Grade of C or MA 172 Minimum Grade of C or MA 115 Minimum Grade of C or MA 121 Minimum Grade of C or MA 120 Minimum Grade of C or MA 287 Minimum Grade of C or MA 125 Minimum Grade of C or MA 132 Minimum Grade of C or MA 126 Minimum Grade of C or MA 233 Minimum Grade of C or MyMathTest 080 or University test - Math 85

CH 132 General Chemistry II 3 cr

Continuation of CH 131. Topics include solutions, colligative properties, chemical kinetics, equilibrium, acids and bases, pH, buffers, titrations, thermodynamics, and electrochemistry. Additional topics may include nuclear chemistry, organic and biochemistry, chemistry of inorganic compounds, transition metal complexes, and industrial chemistry. Both the lecture and laboratory experiences of CH 131 (General Chemistry I) are prerequisites. CH 132L must be taken concurrently. Together, CH 132 and CH 132L count as one laboratory science course, partially fulfilling general education requirements. (Offered Fall and Spring Semesters.) Core Course.

Prerequisite: CH 115 Minimum Grade of D or (CH 131 Minimum Grade of D and CH 131L Minimum Grade of D)

CH 132L General Chemistry II Lab 1 cr

Laboratory exercises associated with CH 132. CH 132 must be taken concurrently or as a prerequisite. Together, CH 132 and CH 132L count as one laboratory science course, partially fulfilling general education requirements. Core course.

Prerequisite: CH 131 Minimum Grade of D and CH 131L Minimum Grade of D

CH 141 Chemical Principles 4 cr

A one-semester accelerated introductory course in chemistry for majors, minors, and others seeking a more physical and quantitative treatment. Covers stoichiometry, states of matter, chemical bonding and structure, solutions, kinetics, gaseous and aqueous equilibria, thermodynamics, electrochemistry, and nuclear chemistry. (Offered Fall and Spring Semesters.) Core Course.

Prerequisite: Toledo Chem Placemnt Tst 45

Corequisite: CH 141L

CH 141L Chemical Principles Lab 1 cr

Laboratory exercises associated with CH 141. CH 141 must be taken concurrently or as a prerequisite. Together, CH 141 and CH 141L count as one laboratory science course, partially fulfilling general education requirements.

Prerequisite: CH 141 (may be taken concurrently) Minimum Grade of D

Corequisite: CH 141

CH 150 Intro to Computer Chemistry 2 cr

This course will introduce the student to direct application and use of computer activity for applications in chemistry; acquisition of data from instrumentation, data analysis, presentation of experimental data, and chemical structure and modeling programs.

Prerequisite: (CH 115 Minimum Grade of D or (CH 131 Minimum Grade of D and CH 131L Minimum Grade of D) or (CH 141 (may be taken concurrently) Minimum Grade of D and CH 141L (may be taken concurrently) Minimum Grade of D)) and ((MA 113 Minimum Grade of D or MA 172 Minimum Grade of D) or (MA 115 Minimum Grade of D or MA 121 Minimum Grade of D) or (MA 125 Minimum Grade of D or MA 132 Minimum Grade of D) or (MA 126 Minimum Grade of D or MA 233 Minimum Grade of D))

CH 201 Organic Chemistry I 3 cr

Fundamentals of structure and chemical behavior of organic molecules including nomenclature, properties, structure, stereochemistry, spectroscopy (both infrared and nuclear magnetic resonance), reactions, synthesis, and mechanisms of alkanes, alkenes, alkyl halides, and alcohols. (Offered Fall and Spring Semesters.) CH 201L must be taken concurrently.

Prerequisite: CH 116 Minimum Grade of D or (CH 132 Minimum Grade of D and CH 132L Minimum Grade of D) or (CH 141 Minimum Grade of D and CH 141L Minimum Grade of D)

Corequisite: CH 201L

CH 201L Organic Chemistry I Lab 1 cr

Laboratory exercises associated with CH 201. (Offered Fall and Spring Semesters.) The laboratory introduces basic organic laboratory practices such as the collection of physical properties data, separation and purification techniques, synthesis, and spectroscopic methods. CH 201 must be taken concurrently or as a prerequisite.

Prerequisite: ((CH 116 Minimum Grade of D) or (CH 132 Minimum Grade of D and CH 132L Minimum Grade of D))

Corequisite: CH 201

CH 202 Organic Chemistry II 3 cr

Continuation of study of structure and chemical behavior of organic molecules including aromatic compounds, ketones and aldehydes amines, carboxylic acids and their derivatives, carbohydrates, amino acids, peptides and proteins, nucleic acids, alkynes, ethers and epoxides, and conjugated dienes. (Offered Fall and Spring Semesters.) CH 202L must be taken concurrently.

Prerequisite: (CH 201 Minimum Grade of D and CH 201L Minimum Grade of D) or CH 222 Minimum Grade of D

Corequisite: CH 202L

CH 202L Organic Chemistry II Lab 1 cr

Laboratory exercises associated with CH 202. The laboratory continues with the basic organic laboratory practices with additional synthetic methods. (Offered Fall and Spring Semesters.) CH 202 must be taken concurrently or as a prerequisite.

Prerequisite: (CH 222 Minimum Grade of D) or (CH 201 Minimum Grade of D and CH 201L Minimum Grade of D)

Corequisite: CH 202

CH 265 Introductory Analysis 3 cr

A detailed study of the fundamental theories and principles of chemistry with emphasis on their application to quantitative analysis. Because proficiency of the material covered in CH 132 is vital for success in this course, students are strongly advised to take the two courses as close together as schedules permit. (Offered Fall and Spring Semesters.)

Prerequisite: (CH 132 Minimum Grade of C and CH 132L Minimum Grade of C) or (CH 116 Minimum Grade of C)

Corequisite: CH 265L

CH 265L Introductory Analysis Lab 1 cr

Laboratory exercises associated with CH 265. (Offered Fall and Spring Semesters.) CH 265 must be taken concurrently or as a prerequisite.

Prerequisite: (CH 132 Minimum Grade of C and CH 132L Minimum Grade of C) or (CH 116 Minimum Grade of C)

Corequisite: CH 265

CH 301 Physical Chemistry I 3 cr

Gas Laws, First and Second Law of Thermodynamics, Phase Equilibrium, Chemical Equilibrium, Physical Chemistry of Solutions, Electrochemistry, Transport Properties, and Chemical Kinetics. (Offered Fall Semester).

Prerequisite: (CH 132 Minimum Grade of C and CH 132L Minimum Grade of C and MA 126 Minimum Grade of D) and (PH 115 Minimum Grade of D or PH 202 Minimum Grade of D)

Corequisite: CH 301L

CH 301L Physical Chemistry I Lab-W 1 cr

Laboratory exercises associated with CH 301. (Offered Fall Semester.) Lab is required for chemistry majors.

Prerequisite: (EH 102 Minimum Grade of C or EH 105 Minimum Grade of C) and (CH 132 Minimum Grade of C and CH 132L Minimum Grade of C) and (MA 126 Minimum Grade of D) and (PH 202 Minimum Grade of D or PH 115 Minimum Grade of D)

Corequisite: CH 301

CH 302 Physical Chemistry II 3 cr

Quantum Theory and Applications to Atoms and Molecules, Spectroscopy, and Statistical Thermodynamics. (Offered Spring Semester.) Required for chemistry majors.

Prerequisite: ((CH 265 Minimum Grade of D and CH 265L Minimum Grade of D) or CH 266 Minimum Grade of D) and (EH 102 Minimum Grade of C or EH 105 Minimum Grade of C) and (MA 126 Minimum Grade of D or MA 223 Minimum Grade of D) and (PH 202 (may be taken concurrently) Minimum Grade of D or PH 217 Minimum Grade of D) or (MA 227 (may be taken concurrently) Minimum Grade of D or MA 234 (may be taken concurrently) Minimum Grade of D) and (PH 115 Minimum Grade of D or PH 113 Minimum Grade of D)

Corequisite: CH 302L

CH 302L Physical Chemistry II Lab - W 1 cr

Laboratory exercises associated with CH 302. (Offered Spring Semester.) Lab is required for chemistry majors.

Prerequisite: ((EH 102 Minimum Grade of C or EH 105 Minimum Grade of C) and CH 265 Minimum Grade of D) and (CH 265L Minimum Grade of D or CH 266 Minimum Grade of D) and (MA 126 Minimum Grade of D or MA 233 Minimum Grade of D) and (PH 202 (may be taken concurrently) Minimum Grade of D or PH 217 Minimum Grade of D) or (MA 227 (may be taken concurrently) Minimum Grade of D or MA 234 (may be taken concurrently) Minimum Grade of D) and (PH 115 Minimum Grade of D or PH 113 Minimum Grade of D)

Corequisite: CH 302

CH 394 Directed Studies - 1-4 cr

Student works in a research laboratory under faculty guidance. May be repeated; sum of all directed studies cannot exceed eight (8) credits. Requires Junior standing or permission of Department Chair.

CH 401 Intern Inorganic Chemistry 3 cr

Atomic and molecular structure and bonding emphasizing the use of symmetry, group theory, and molecular orbitals; NMR spectrometry; coordination chemistry; organometallic chemistry and homogeneous catalysis. (Offered Spring Semester).

Prerequisite: (CH 301 Minimum Grade of D and CH 301L Minimum Grade of D and CH 302 Minimum Grade of D and CH 302L Minimum Grade of D) or CH 333 Minimum Grade of D

CH 413 Org Reaction Mech and Synth 3 cr

Study of organic reaction kinetics and mechanisms. Study of the synthesis of natural products and their mechanism of formation with concurrent discussion of nuclear magnetic resonance spectroscopy. (Offered as required).

Prerequisite: (CH 202 Minimum Grade of D or CH 223 Minimum Grade of D) and (CH 301 Minimum Grade of D or CH 332 Minimum Grade of D)

CH 440 Biochemistry I 3 cr

Study of fundamental biochemical concepts; emphasis is placed on protein, carbohydrate, and lipid structures as related to their functional behavior; enzyme kinetics and mechanisms of action; thermodynamic relationships in biochemical systems. (Offered Fall Semester). Cross-listed with BLY 440.

Prerequisite: (CH 202 Minimum Grade of D or CH 223 Minimum Grade of D)

Cross-Listed: BLY 440

CH 441 Biochemistry II 3 cr

Study of the reaction and regulations of intermediary metabolism; the biochemistry of genetic systems to include regulatory mechanisms and protein synthesis. (Offered Spring Semester). Cross-listed with BLY 441.

Prerequisite: CH 440 Minimum Grade of D or BLY 440 Minimum Grade of D

Cross-Listed: BLY 441

CH 443 Lab Studies in Biochemistry 2 cr

Course familiarizes the student with the basic laboratory techniques commonly employed in biochemical research. (Offered Spring Semester). Cross-listed with BLY 443.

Prerequisite: CH 440 Minimum Grade of D or BLY 440 Minimum Grade of D

Cross-Listed: BLY 443

CH 451 Biophysical Chemistry 3 cr

The study of the hydrodynamic and optical properties and methods used to elucidate the structure, conformation and function of biological macromolecules. (Offered as required). Prerequisite: Permission of instructor

Prerequisite: (CH 300 Minimum Grade of D or CH 301 Minimum Grade of D or CH 332 Minimum Grade of D) and (CH 440 Minimum Grade of D or BLY 440 Minimum Grade of D)

CH 465 Instrumental Analysis 3 cr

Modern analytical instruments, their operating principles, and their applications. (Offered Fall Semester).

Prerequisite: ((CH 265 Minimum Grade of D and CH 265L Minimum Grade of D) or CH 266 Minimum Grade of D) and (CH 300 Minimum Grade of D and CH 300L Minimum Grade of D) or ((CH 302 Minimum Grade of D and CH 302L Minimum Grade of D) or CH 333 Minimum Grade of D) or ((CH 301 Minimum Grade of D and CH 301L Minimum Grade of D) or CH 332 Minimum Grade of D)

Corequisite: CH 465L

CH 465L Instrumental Analysis Lab 2 cr

Laboratory exercises associated with CH 465. (Offered Fall Semester.)

Prerequisite: ((CH 265 Minimum Grade of D and CH 265L Minimum Grade of D) or CH 266 Minimum Grade of D) and (CH 300 Minimum Grade of D and CH 300L Minimum Grade of D) or ((CH 302 Minimum Grade of D and CH 302L Minimum Grade of D) or CH 333 Minimum Grade of D) or ((CH 301 Minimum Grade of D and CH 301L Minimum Grade of D) or CH 332 Minimum Grade of D)

Corequisite: CH 465

CH 490 Sp Top - 1-4 cr

Study of a significant topic in Chemistry. May be repeated for a maximum of four credits when the content varies. Requires Senior standing.

CH 492 Seminar I 1 cr

Information retrieval from scientific references, journals, and on-line databases directed toward computer-based preparation of a student seminar having as the capstone experience a formal seminar for Department Faculty and students. (Offered Spring Semester). Requires Senior standing or permission of Department Chair.

CH 494 Directed Studies 1-4 cr

Student works in a research laboratory under faculty guidance. May be repeated; sum of all directed studies cannot exceed eight (8) credits. Requires Senior standing or permission of Department Chair.

CH 499 Sr Honors Chemistry Project-H 3 cr

Student research under faculty direction; written report and oral presentation of research work to faculty and students. This course may be repeated once for a maximum of six credits. Requires permission of department chair.

CH 514 Environmental Chemistry 3 cr

Introduces the cycling of elements in the earth as groundwork for understanding the chemical reactions and fate of chemical species introduced as contaminants to the environment. The chemistry of natural and anthropogenic contaminants in the atmosphere, the hydrosphere, the lithosphere and the transport and transformation of chemical species in the environment are discussed. CH 514L must be taken concurrently. (Offered in Fall Semester.)

Prerequisite: (CH 202 Minimum Grade of D or CH 223 Minimum Grade of D)

Corequisite: CH 514L

CH 514L Environmental Chemistry Lab 1 cr

Laboratory exercises associated with CH 514. Real-world samples will be used to learn appropriate isolation techniques followed by chemical and instrumental analysis. CH 514 must be taken concurrently. (Offered in Fall Semester.)

Prerequisite: (CH 202 Minimum Grade of D or CH 223 Minimum Grade of D)

Corequisite: CH 514

CH 515 Environmental Toxicology 4 cr

Introduction to the scientific and technical principles of toxicological processes in the context of the ecosystem. Students will understand both the types of major environmental toxicants and how to properly evaluate their toxicity and factors that influence toxicity. Students will recognize and coherently formulate risk assessment and by using the tools and techniques acquired, develop and communicate proposals for remedy.

Prerequisite: (BLY 301 Minimum Grade of C and BLY 302 Minimum Grade of C) and (CH 201 Minimum Grade of C and CH 202 Minimum Grade of C) and (CH 540 Minimum Grade of B and CH 541 Minimum Grade of B)

Cross-Listed: EXT 515, MAS 515

CH 540 Biochemistry I 3 cr

Study of fundamental biochemical concepts; emphasis is placed on protein, carbohydrate, and lipid structures as related to their functional behavior, enzyme kinetics and mechanisms of action; thermodynamic relationships in biochemical systems. (Offered Fall Semester.) Requires Graduate status. Cross-listed with BLY 540.

Prerequisite: (CH 202 Minimum Grade of D or CH 223 Minimum Grade of D)

CH 541 Biochemistry II 3 cr

Study of the reactions and regulations of intermediary metabolism; the biochemistry of genetic systems to include regulatory mechanisms and protein synthesis. (Offered Spring Semester.) Requires Graduate status. Cross-listed with BLY 541.

Prerequisite: CH 540 Minimum Grade of B or BLY 540 Minimum Grade of B

CH 543 Lab Studies in Biochemistry 2 cr

Course familiarizes the student with the basic laboratory techniques commonly employed in biochemical research. (Offered Spring Semester.) Requires Graduate status. Cross-listed with BLY 543.

Prerequisite: CH 441 (may be taken concurrently) Minimum Grade of D or CH 540 Minimum Grade of B or CH 541 (may be taken concurrently) Minimum Grade of B

CH 551 Biophysical Chemistry 3 cr

The study of the hydrodynamic and optical properties and methods used to elucidate the structure, conformation and function of biological macromolecules. (Offered as required.)

Prerequisite: (CH 300 Minimum Grade of D or CH 301 Minimum Grade of D or CH 332 Minimum Grade of D) and (CH 440 Minimum Grade of D or BLY 440 Minimum Grade of D)

CH 565 Instrumental Analysis 3 cr

Modern analytical instruments, their operating principles, and their applications. (Offered Fall Semester). Requires Graduate status.

Prerequisite: ((CH 265 Minimum Grade of D and CH 265L Minimum Grade of D) or CH 266 Minimum Grade of D) and (CH 300 Minimum Grade of D and CH 300L Minimum Grade of D) or ((CH 302 Minimum Grade of D and CH 302L Minimum Grade of D) or CH 333 Minimum Grade of D) or ((CH 301 Minimum Grade of D and CH 301L Minimum Grade of D) or CH 332 Minimum Grade of D)

CH 565L Instrumental Analysis Lab 2 cr

Laboratory exercises associated with CH 565. (Offered Fall Semester.) Requires Graduate status.

Prerequisite: ((CH 265 Minimum Grade of D and CH 265L Minimum Grade of D) or CH 266 Minimum Grade of D) and (CH 300 Minimum Grade of D and CH 300L Minimum Grade of D) or ((CH 302 Minimum Grade of D and CH 302L Minimum Grade of D) or CH 333 Minimum Grade of D) or ((CH 301 Minimum Grade of D and CH 301L Minimum Grade of D) or CH 332 Minimum Grade of D)

CH 571 Oxy Trans Proteins Marine Org 3 cr

Study of the structure-function relationship of oxygen transport proteins utilized by marine vertebrates and invertebrates. (Offered as required.)

Prerequisite: Graduate status or permission of instructor.

CH 590 Special Topics - 1-4 cr

Study of a significant topic in chemistry. May be repeated for a maximum of four credits when the content varies. Requires Graduate status.

CH 592 Seminar 1 cr

The use of scientific references and journals retrieval. Library assignment may be directed toward preparation of student seminars which are scheduled concurrently. (Offered as required). Requires Graduate status.

CH 594 Directed Studies- 1-4 cr

Literature survey and research under senior staff guidance. May be repeated but not to exceed four credits.