

COURSES FOR CHEMISTRY AND BIOCHEMISTRY

Chemistry and Biochemistry Courses

CH100 General Chemistry I - Plus

N

Hours 5

This course is designed for students with lower level math backgrounds to successfully complete the freshman level entry course in general chemistry, a foundational and core science survey course. This is a 5 credit hr course for students who are taking, or meet the requirements to take, MATH 112 or 113 and who do not have placement into at least MATH 115. Chemistry topic coverage for CH100 is identical to that of CH101 and CH117 (ch E-10, Tro textbook), but the course content is expanded to include additional development of basic science, chemistry, math, and problem-solving skills. Additional lecture time is included for instruction in these areas, including added supervised problem-solving and mentoring of these students to better prepare and train them for successful completion of the first semester of general chemistry. Students who receive credit for CH100 will qualify to subsequently take CH102. Students cannot receive credit for both CH 100 and CH 101.

Prerequisite(s): MATH 100 or MATH 112 or higher

Natural Science

CH101 General Chemistry

N

Hours 4

Three lectures and one three-hour laboratory. First semester of the general chemistry sequence designed for students majoring in science, engineering, or pre-health profession pathways. Topics include basic chemical calculations, structure and naming of compounds, and behavior of gases. Degree credit is not awarded for both CH 101 and CH 100 or for both CH 101 and CH 117. Usually offered in the fall, spring, and summer semesters.

Prerequisite(s): UA Math Placement Test Score of 370-439 or ACT Math Subscore of 28 or old SAT Math Subscore of 630 or new SAT Math Subscore of 650

Prerequisite(s) with concurrency: MATH 112 or MATH 113 or MATH 115 or MATH 125 or MATH 145 or MATH 126 or MATH 146 or MATH 227 or MATH 247

Natural Science

CH102 General Chemistry

N

Hours 4

Three lectures and one three-hour laboratory. Second semester of the general chemistry sequence designed for students majoring in science, engineering, or pre-health profession pathways. Topics include chemical equilibria, kinetics, and thermodynamics. Degree credit is not awarded for both CH 102 and CH 105 or both CH 102 and CH 118. Usually offered in the fall, spring, and summer semesters.

Prerequisite(s): (CH 100 or CH 101, or CH 117) and (MATH 112 or MATH 115 or MATH 125 or MATH 145 or MATH 126 or MATH 146 or MATH 227 or MATH 247 or UA Math Placement Test Score of 370-439 or ACT Math Subscore of 28 or old SAT Math Subscore of 630 or new SAT Math Subscore of 650)

Natural Science

CH104 Introductory Chemistry

N

Hours 4

Three lectures and one three-hour laboratory. The course is primarily for students in the Capstone College of Nursing and the College of Human Environmental Sciences; it may not be substituted for CH 101 except with departmental permission. Degree credit is not awarded for both CH 104 and CH 107. An introductory survey of the facts, principles, and theories of chemistry. Usually offered in the fall and summer semesters.

Natural Science

CH105 Introductory Org Chem

N

Hours 4

Three lectures and one three-hour laboratory. Not open to chemistry majors or minors or to students who have earned credit for CH 102. Degree credit is not awarded for both CH 105 and CH 102 or both CH 105 and CH 108. The course may not be substituted for CH 101 or CH 102. Brief survey of organic and biochemistry. Usually offered in the spring and summer semesters.

Prerequisite(s): CH 104 or CH 101 or CH 100 or CH 117

Natural Science

CH117 Honors General Chemistry

N, UH

Hours 4

Three lectures and one three-hour laboratory. Not open to students who have earned credit for CH 101. Degree credit is not awarded for both CH 117 and CH 101. A comprehensive study of the fundamental facts, principles, and theories of general chemistry. Usually offered in the fall semester.

Prerequisite(s) with concurrency: MATH 125 or MATH 145 or MATH 126 or MATH 146 or MATH 227 or MATH 247

Natural Science, University Honors

CH118 Honors General Chemistry

N, UH

Hours 4

Three lectures and one three-hour laboratory. Not open to students who have earned credit for CH 102. Degree credit is not awarded for both CH 118 and CH 102, or both CH 118 and CH 105. Continuation of CH 117 with basic inorganic chemistry. Includes a systematic study of the elements and of the structures, properties, and reactions of their compounds. Usually offered in the spring semester.

Prerequisite(s): CH 117 or CH 101 grade of A- or higher

Natural Science, University Honors

CH223 Quantitative Analysis

Hours 4

Three lectures and one three hour laboratory. Comprehensive course covering classical methods of quantitative analysis as well as an introduction to electrochemical, spectroscopic and chromatographic methods.

Prerequisite(s): CH 102 or CH 118

CH231 Elem Organic Chemistry I

Hours 3

First semester of a two-semester sequence in organic chemistry for students majoring in the sciences, engineering, and pre-health professional programs. Topics include structure, stereochemistry, and reactivity (addition, substitution, and elimination reactions) of organic compounds.

Prerequisite(s): CH 102 or CH 118

CH232 Elem Organic Chem II

Hours 3

Second semester of a two-semester sequence in organic chemistry for students majoring in the sciences, engineering, and pre-health professional programs. Topics include structure, reactivity, and analysis of major organic functional groups, including carbonyls, amines, and conjugated pi systems.

Prerequisite(s): CH 231

CH237 Elem Organic Chem Lab

Hours 2

A one-hour lecture and five-hour laboratory. Students will perform experiments to illustrate the reactions, principles, and techniques presented in CH 231 and CH 232. Designed to be taken concurrently with CH 232.

Prerequisite(s): CH 231

Prerequisite(s) with concurrency: CH 232

CH338 Elem Organic Chem Lab II

W

Hours 2

A one-hour lecture and five-hour laboratory. The course is designed for chemistry majors to demonstrate advanced organic chemistry concepts. Writing proficiency is required for a passing grade in this course. A student who does not write with the skill normally required of an upper-division student will not earn a passing grade, no matter how well the student performs in other areas of the course.

Prerequisite(s): CH 232 and CH 237 with a minimum grade of C-

Writing

CH340 Elem Physical Chem

Hours 3

Three lectures. This course is designed for students in the pre-health professional degree or pursuing the chemistry minor and is a study of the application of physical chemical concepts in biological systems. It is a general course not requiring extensive preparation in calculus.

Prerequisite(s): Minimum grade of C- in CH 223

Prerequisite(s) with concurrency: PH 102 or PH 106 or PH 126

CH343 Elem Phy Chem Lab

Hours 1

One three-hour laboratory. Students will perform experiments to illustrate the principles and techniques of physical chemistry. The course is designed to be taken concurrently with CH 340.

Prerequisite(s) with concurrency: CH 340 or CH 441

CH396 Undergrad Research

Hours 1-3

3 hours laboratory per credit hour. The student works on a research project under the direction of a chemistry faculty member. CH 396 is offered in the fall, CH 398 is offered in the spring, and CH 399 is offered in the summer.

CH398 Undergrad Research

Hours 1-3

3 hours laboratory per credit hour. The student works on a research project under the direction of a chemistry faculty member. CH 396 is offered in the fall, CH 398 is offered in the spring, and CH 399 is offered in the summer.

CH399 Undergrad Research

Hours 1-3

3 hours laboratory per credit hour. The student works on a research project under the direction of a chemistry faculty member. CH 396 is offered in the fall, CH 398 is offered in the spring, and CH 399 is offered in the summer.

CH405 Medicinal Chemistry

Hours 3

Fundamental considerations in drug design. Includes lead discovery, target identification and validation, pharmacodynamics, pharmacokinetics and metabolism, and formulations/drug delivery systems. Chemical modifications to improve efficacy and pharmacokinetics will be emphasized.

Prerequisite(s): Minimum grade of C- in CH 232 and either CH 461, BSC 300, or BSC 450

CH409 Organometallic Chemistry

Hours 3

Survey of the typical reactions of organotransition metal complexes with a focus on the fundamental mechanisms of these reactions and the application of organometallic catalysts.

Prerequisite(s): CH 413

Prerequisite(s) with concurrency: CH 441

CH413 Inorganic Chemistry

Hours 4

Three lectures and one three-hour laboratory. Survey in areas of coordination, main-group, and organometallic chemistry. Laboratory experiments involve the preparation, purification, and identification of inorganic compounds. Usually offered in the fall semester.

Prerequisite(s): Minimum grade of C- in CH 338 and CH 441

CH415 Solid State Materials Chemistry

Hours 3

This course is designed for students interested in pursuing research in materials chemistry. This course looks at materials science from the chemist's point of view and uses chemistry language.

Prerequisite(s): CH 102 or 118 with a minimum grade of C-

Prerequisite(s) with concurrency: CH 340 or CH 413 or CH 441 or PH 441 or PH 481 with a minimum grade of C-

CH424 Instrumental Analysis

W

Hours 4

Two lectures and one five-hour laboratory. The course covers the general operating principles of the commonly used analytical instruments with an emphasis on theory. Wherever possible, mathematical interpretations and derivations are given. Usually offered in the spring semester. Writing proficiency is required for a passing grade in this course. A student who does not write with the skill normally required of an upper-division student will not earn a passing grade, no matter how well the student performs in other areas of the course.

Prerequisite(s): Minimum grade of C- in CH 223 and CH 441 and CH 448

Writing

CH426 Chemometrics

Hours 3

Chemometrics involves the application of statistical and mathematical methods to chemistry. Areas of emphasis will be data and error analysis, calibration, experimental design, signal processing and transform procedures, and data description and enhancement.

Prerequisite(s): CH 223

Prerequisite(s) with concurrency: CH 442; and CH 448

CH431 Physical Organic Chemistry

Hours 3

This class provides an overview of the theory and mechanism of organic molecular structure and transformations. Topics will include evaluation of organic electronic structure; molecular orbitals; molecular dynamics and energetics; tools to study organic reaction mechanisms; and energetics of reaction paths.

Prerequisite(s): CH 232 with a minimum grade of C-

Prerequisite(s) with concurrency: CH 442

CH432 Advanced Synthetic Organic Chemistry

Hours 3

This course will serve as a co-listed course with CH 532. The main goal of this course is to instruct advanced organic chemistry to undergraduates.

Prerequisite(s): CH 232

CH437 Spectroscopic Techniques

Hours 3

This course is an introduction to the theory, application, and interpretation of four major types of structural analysis used by synthetic chemists: absorption, infrared, and nuclear magnetic resonance spectroscopy, as well as mass spectrometry. We will focus heavily on interpretation of spectra and application of these tools to address questions of structure and reactivity. While this is an organic chemistry class, examples of applications to organometallic and inorganic materials will also be presented.

Prerequisite(s): Minimum grade of C- in CH 232 and CH 338

Prerequisite(s) with concurrency: CH 442; and CH 448

CH441 Physical Chemistry I

Hours 3

The course is designed for chemistry majors in the BCH degree and is a study of the structure and properties of matter with emphasis on theoretical principles and their mathematical interpretation.

Prerequisite(s): Minimum grade of C- or better in CH 223 and MATH 227 or MATH 247

Prerequisite(s) with concurrency: PH 106 or PH 126

CH442 Physical Chemistry II

Hours 3

This course covers the principles that govern the macroscopic behavior of chemical systems. These principles are contained in the laws of thermodynamics and chemical kinetics. The goal of the first part of the course is to understand the laws of thermodynamics and learn to apply them to chemical systems. The second part will deal with understanding the kinetic theory of gases and elementary chemical kinetics.

Prerequisite(s): minimum grade of C- in CH 441

CH448 Physical Chemistry Lab

W

Hours 2

This class is designed to illustrate the experimental principles behind the theory presented in the physical chemistry lecture courses. The course is designed to be taken concurrently with CH 442. Writing proficiency is required for a passing grade in this course. A student who does not write with the skill normally required of an upper-division student will not earn a passing grade, no matter how well the student performs in other areas of the course.

Prerequisite(s): minimum C- grade in CH 441

Prerequisite(s) with concurrency: CH 442

Writing

CH461 Biochemistry I

Hours 3

Foundational course in biochemistry. A survey of the physical and chemical properties of the major classes of biomolecules including their molecular components and methods of isolating and analyzing them.

Prerequisite(s): Minimum grade of C- in CH 223 and CH 232 and CH 237

CH462 Biochemistry II

Hours 3

Three lectures. Survey of the principal pathways of carbon, nitrogen, and energy metabolism in biochemical systems.

Prerequisite(s): Minimum grade of C- in CH 461 or BSC 450

CH463 Biochemistry Laboratory

W

Hours 3

One lecture and one six-hour laboratory. Biochemical techniques within the structure of a semester-long research project. Topics include protein purification and chromatography, spectroscopy, electrophoresis, kinetics, and DNA manipulation. Writing proficiency is required for a passing grade in this course. A student who does not write with the skill normally required of an upper-division student will not earn a passing grade, no matter how well the student performs in other areas of the course.

Prerequisite(s): Minimum grade of C- in CH 461

Prerequisite(s) with concurrency: CH 462

Writing

CH466 Bioorganic Chemistry

Hours 3

This course will be divided into two main areas. We will begin with methods for studying enzyme reaction mechanisms. This section will include steady-state enzyme kinetics, derivation of rate equations, enzyme inhibition, isotope exchange methods, pH and viscosity effects, kinetic isotope effects, and site-directed mutagenesis. We will then utilize these methods in order to investigate the chemical mechanisms enzymes use to catalyze specific reactions (hydrolysis; group transfer; 1,1 hydrogen shift; 1,2 hydrogen shift; C-C bond formations; and redox chemistry). We will also cover the chemistry associated with several cofactors required by enzymes (flavins, thiamin pyrophosphate, tetrahydrofolate, etc).

Prerequisite(s): CH 461

CH474 Chemistry of Beer & Brewing

Hours 3

This course provides an introduction to the science of brewing beer, its historical impacts, and how the modern beer industry operates. The history of fermentation and its impact on culture will be discussed. Students will learn about the complex chemical substances and chemical transformations responsible for the flavor, aroma, texture, & color variations beer. The Science and Chemistry of Beer & Brewing exposes students to the process of making beer from fermentation and flavoring of sweet mashes through yeast growth and accompanying chemical transformations. Participants will learn about the different types of grains and mashes used to make beer and will learn to evaluate beer, choose beer to compliment the chemistry and taste of foods and differentiate between many locally and internationally produced ales. There is a significant biochemistry and organic Chemistry involved in the malting, mashing and fermentation process and understanding the chemistry behind the flavor, aroma, and color of beer. Participants will learn to correlate the scientific underpinnings with the flavor and aroma characteristics of the resultant beers. Field trips will allow students to see the beer brewing process in action, visit QA laboratories, interact with brewers directly, and evaluate ingredients such as barley, yeast and hops.

Prerequisite(s) with concurrency: CH 232 and CH 237

CH493 Honors Research Sem

UH

Hours 1

The course is designed for students in the Chemistry Department Honors Program.

University Honors

CH494 Honors Research Sem

UH

Hours 1

The course is designed for students in the Chemistry Department Honors Program.

University Honors

CH497 Intro To Research

Hours 1-3

Three hours laboratory per credit hour. The student works on a research project under the direction of a chemistry faculty member. A final research report is required. CH 497 is offered in the fall; CH 498 is offered in the spring; and CH 499 is offered in the summer.

Prerequisite(s): CH 232 and CH 338

Prerequisite(s) with concurrency: CH 442; and CH 448

CH498 Intro To Research

Hours 1-3

Three hours laboratory per credit hour. The student works on a research project under the direction of a chemistry faculty member. A final research report is required. CH 497 is offered in the fall; CH 498 is offered in the spring; and CH 499 is offered in the summer.

Prerequisite(s): CH 232 and CH 338

Prerequisite(s) with concurrency: CH 442; and CH 448

CH499 Intro To Research

Hours 1-3

Three hours laboratory per credit hour. The student works on a research project under the direction of a chemistry faculty member. A final research report is required. CH 497 is offered in the fall; CH 498 is offered in the spring; and CH 499 is offered in the summer.

Prerequisite(s): CH 232 and CH 338

Prerequisite(s) with concurrency: CH 342 or CH 442; and CH 348 or CH 448