

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

Prerequisite(s) with concurrency: MATH 112 or MATH 113 or higher

Natural Science

CH101 General Chemistry

N

Hours 4

Three lectures and one three-hour laboratory. Degree credit is not awarded for both CH 101 and CH 100 or for both CH 101 and CH 117. A survey of the fundamental facts, principles, and theories of general chemistry. Usually offered in the fall, spring, and summer semesters.

Prerequisite(s): MATH 113 or (MATH 115 or MATH 125 or MATH 145 or MATH 126 or MATH 146 with concurrent enrollment allowed)

Natural Science

CH102 General Chemistry

N

Hours 4

Three lectures and one three-hour laboratory. Degree credit is not awarded for both CH 102 and CH 105 or both CH 102 and CH 118. Continuation of CH 100 or CH 101, with basic inorganic chemistry. Includes a systematic study of the elements and the structures, properties, and reactions of their compounds. Usually offered in the fall, spring, and summer semesters.

Prerequisite(s): CH 100, CH 101, or CH 117 MATH 112 or 115

Prerequisite(s) with concurrency: MATH 113

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.

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

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. Usually offered in the fall, spring and summer semesters.

Prerequisite(s): CH 102 or CH 118

CH231 Elem Organic Chemistry I

Hours 3

Three lectures. The course is an introduction to the theory and principles of organic chemistry. Topics include organic structure, syntheses, and analyses. Usually offered in the fall, spring, and summer semesters.

Prerequisite(s): CH 102 or CH 118

CH232 Elem Organic Chem II

Hours 3

Three lectures. This course is a continuation of CH 231. Usually offered in the fall, spring, and summer semesters.

Prerequisite(s): CH 231

CH237 Elem Organic Chem Lab

Hours 2

A one-hour lecture and five-hour laboratory. Designed for chemistry majors and chemistry minors to take concurrently with CH 232. Usually offered in the fall, spring, and summer sessions.

Prerequisite(s): CH 231

Prerequisite(s) with concurrency: CH 232

CH331 Honors Organic Chemistry 1

UH

Hours 3

Honors Organic Chemistry will combine a modern in-depth insight into our chemical world with an evolutionary understanding of how the science of chemistry came to be what it is now, and how and where it influences our everyday lives. This course may better serve the interests of students majoring in Chemistry, Chemical Biology, Biological Sciences, Pharmacy, and Material and Engineering Sciences by the inclusion of traditional chemistry topics along with careful examination of the impact of chemistry on the world around us.

Prerequisite(s): CH 102 or 118

University Honors

CH332 Honors Organic Chemistry 2

UH

Hours 3

Honors Organic Chemistry will combine a modern in-depth insight into our chemical world with an evolutionary understanding of how the science of chemistry came to be what it is now, and how and where it influences our everyday lives. This course may better serve the interests of students majoring in Chemistry, Chemical Biology, Biological Sciences, Pharmacy, and Material and Engineering Sciences by the inclusion of traditional chemistry topics along with careful examination of the impact of chemistry on the world around us.

Prerequisite(s): CH 231 or CH 331

University Honors

CH338 Elem Organic Chem Lab II

W

Hours 2

A one-hour lecture and five-hour laboratory. The course is designed for chemistry majors. Usually offered in the fall 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): CH 232 and CH 237

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.

Prerequisite(s): CH 223 and PH 102 or PH 106 or PH 126

CH341 Physical Chemistry

Hours 3

Three lectures. The course is designed for chemistry majors and is a study of the structure and properties of matter with emphasis on theoretical principles and their mathematical interpretation. Usually offered in the fall semester.

Prerequisite(s): CH 223 and MATH 227 or MATH 247

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

CH342 Physical Chemistry

Hours 3

Three lectures. The course is designed for chemistry majors. Continuation of CH 341. Usually offered in the spring semester.

Prerequisite(s): CH 341

CH343 Elem Phy Chem Lab

Hours 1

One three-hour laboratory. The course is designed to be taken concurrently with CH 340. Usually offered in the fall semester.

Prerequisite(s) with concurrency: CH 340

CH348 Physical Chemistry Lab

W

Hours 2

6 hours of laboratory. The course is designed to be taken concurrently with CH 342. 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): CH 341 and CH 342

Prerequisite(s) with concurrency: CH 342

Writing

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): 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 341 or CH 401 or CH 413

CH410 Scientific Glassblowing

Hours 3

The course introduces students to the fundamentals of scientific glassblowing through hands-on training. Usually offered during Interim.

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): CH 338 and CH 341

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): CH 223 and CH 341 and CH 348

Prerequisite(s) with concurrency: CH 348

Writing

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

CH435 Inter Organic Chem

Hours 3

Three lectures. The course is designed to familiarize the student with mechanistic and synthetic organic chemistry. Usually offered in the fall semester.

Prerequisite(s): CH 232 and CH 342

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): CH 232, 338, 342, and 348

CH461 Biochemistry I

Hours 3

Three lectures. Survey of the physical and chemical properties of the molecular components and methods of isolating and analyzing them. Usually offered in the fall semester.

Prerequisite(s): 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 and clinical and forensic chemistry. Usually offered in the spring semester.

Prerequisite(s): CH 461 or BSC 300

CH463 Biochem-Clin/Foren/Chem

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): CH 461 and CH 462

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

CH473 The Study of Oenology

Hours 3

The course will focus on the complex chemical substances and chemical transformations responsible for the flavor, aroma, texture, & color variations in wine. Oenology exposes students to the process of making wine from growing grapes used in wine-making to fermentation of fruit sugars through yeast growth and accompanying chemical transformations.

Prerequisite(s): CH 232 and CH 338

CH474 Chemistry of Beer & Brewing

Hours 3

The instruction will comprise approximately 35 45-minute lecture periods and include visits to breweries in the Rheingau along with historical points of interest. Beyond a historical and cultural introduction, the course will focus on 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 resultant beers and ales.

Prerequisite(s) with concurrency: CH 232 or CH 332, CH 237, and CH 338 with the instructor's permission

CH475 Chemistry of Cooking

Hours 3

Chemistry as a discipline has its roots very early among the natural sciences. The ability to understand, manipulate and control substances in the environment is the central key to humankind's flexible adaptation to surroundings otherwise hostile to human life. Cooking is a subset of that science which facilitates utilization of nutrients in foods and allows for preservation for food for longer periods. Additionally, cooking is a fun, and social activity. When you're cooking, you're a chemist! Every time you follow or modify a recipe you are experimenting with acids and bases, emulsions and suspensions, gels and foams. In your kitchen you denature proteins, crystallize compounds, react enzymes with substrates, and nurture desired microbial life while suppressing harmful microbes. And unlike in a laboratory, you can eat your experiments to verify your hypotheses.

Prerequisite(s): CH 332 or CH 232 or with the instructor's consent.

CH491 Honors Research Sem

UH

Hours 1

The course is designed for students in the Chemistry Department Honors Program. CH 491 and CH 493 are offered in the fall semester; CH 492 and CH 494 are offered in the spring semester.

University Honors

CH492 Honors Research Sem

UH

Hours 1

The course is designed for students in the Chemistry Department Honors Program. CH 491 and CH 493 are offered in the fall semester; CH 492 and CH 494 are offered in the spring semester.

University Honors

CH493 Honors Research Sem

UH

Hours 1

The course is designed for students in the Chemistry Department Honors Program. CH 491 and CH 493 are offered in the fall semester; CH 492 and CH 494 are offered in the spring semester.

University Honors

CH494 Honors Research Sem

UH

Hours 1

The course is designed for students in the Chemistry Department Honors Program. CH 491 and CH 493 are offered in the fall semester; CH 492 and CH 494 are offered in the spring semester.

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 and CH 348 and CH 342

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 and CH 342 and CH 348

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 and CH 342 and CH 348

CH501 Intro Grad Inorg Chem

Hours 3

Generally, this course is for entering graduate students whose undergraduate training in inorganic chemistry is insufficient.

CH505 Medicinal Chemistry

Hours 3

Detailed investigation of the drug design process. Includes lead discovery, target identification and validation, pharmacodynamics, pharmacokinetics, and drug delivery systems. Chemical modification to improve efficacy will be emphasized.

CH510 Scientific Glassblowing

Hours 3

No description available

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CH519 Integrated Foundational Chemistry: Physical/Analytical

Hours 3

Foundational course in graduate chemistry emphasizing the concepts that underpin and connect all chemistry sub disciplines.

CH520 Integrated Foundational Chemistry: Structure/Bonding

Hours 3

Foundational course in graduate chemistry emphasizing the concepts that underpin and connect all chemistry sub disciplines.

CH524 Adv Anl Ch I Spec Meth

Hours 3

Provides graduate students with knowledge of the fundamental aspects of various modern methods of spectroscopic analysis. Reference to analytical applications and experimental methods is made, where relevant.

CH526 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.

CH530 Intro Grad Org Chem

Hours 3

Generally, this course is for entering graduate students whose undergraduate training in organic chemistry is insufficient.

CH531 Adv Organ Chem I-Physicl

Hours 3

Theory and mechanism of organic transformations, detailed evaluation of organic structure, molecular dynamics, molecular orbital interactions, molecular symmetry, stereochemistry of reactions, and energetics of reaction paths.

CH532 Adv Org Ch II React Synt

Hours 3

Fundamentals of organic transformations and advanced synthetic methodology with application to the synthesis of complex organic structures.

CH541 Adv Physical Chem I

Hours 3

No description available

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CH549 Adv Ph Ch II Atom/Mol

Hours 3

No description available

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CH561 Biochemistry I

Hours 3

First-semester course in basic biochemistry. Structure and properties of biological molecules, including proteins, DNA, RNA, carbohydrates, lipids, and enzyme cofactors and prosthetic groups. Introduction to intermediary metabolism and glycolysis. Offered fall semester.

CH562 Biochemistry II

Hours 3

Continuation of basic one-year course in biochemistry. Intermediary metabolism, TCA cycle, oxidative phosphorylation, and catabolism of biomolecules. Biosynthesis of amino acids, nucleotides, carbohydrates, and lipids. DNA and RNA replication, with introduction to recombinant technology. Protein biosynthesis and membrane transport. Offered spring semester.

CH563 Biochemistry Lab

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.

CH564 Adv Biophysical Chem

Hours 3

The study of physical techniques applied to the development and experimental verification of biochemical hypotheses. Examples include forms of spectroscopy, treatment of multiple equilibria, and enzyme kinetics. Examples of applications are drawn from such areas as oxygen transport, oxidative phosphorylation, and photosynthesis.

CH565 Adv Bio-Inorganic Chem

Hours 3

Study of current knowledge on the roles of metal ions in biological systems, including structural and catalytic functions. Topics include bio-coordination chemistry, spectroscopic and magnetic methods, and kinetics.

CH566 Bioorganic Reaction Mechanisms

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).

CH570 Research Techniques Chemistry

Hours 1-6

Independent study in chemistry to learn the tools of chemical research.

CH584 Literature and Communication in Graduate Chemistry

Hours 3

This course is an introduction to researching chemistry literature. Topics covered will primarily be related to scientific critical analysis and effective scientific communication, both written and oral. Students will receive structured guidance from the class instructor (s), chemistry faculty, and their class peers throughout the semester to assist with writing a chemistry research paper and delivering an oral presentation. Successful completion of this course will fulfill the literature seminar requirements (written research paper and seminar) for chemistry graduate students.

CH585 Chemistry Seminars

Hours 1

Course requires attendance at presentations given by graduate students and outside speakers. All graduate students in residence are required to register for seminar during academic semesters except when the student has received permission from the departmental Director of Graduate Studies.

CH586 Research Seminar

Hours 1

Presentation of doctoral dissertation or Plan I Master's thesis research results.

Prerequisite(s): CH 585

CH599 Thesis Research

Hours 1-6

No description available

CH601 Adv Inor Chi:Strct Mth

Hours 3

No description available

CH605 Spec Topics Inorg Chem

Hours 3

No description available

CH609 Organometallic Chem

Hours 3

Structure, bonding, and reactivity of organotransition metallic compounds, mechanisms of transformations and fundamental reaction types, applications to catalysis and organic synthesis.

CH621 Trends In Analytical Chem

Hours 3

No description available

CH626 Surface Analytical Techniques

Hours 3

Introduces the student to the instrumentation and techniques used to study surfaces and interfaces. Spectroscopic, microscopic, desorption, and vacuum techniques are covered.

CH627 Mass Spectrometry

Hours 3

Deals with all areas of mass spectrometry (MS), including single and multiple stage MS and chromatography/MS. The emphasis is on fundamental principles and instrumentation, as well as applications and data interpretation.

CH635 Sel Topics In Org Chem

Hours 3

No description available

CH637 Spectroscopic Techniqua

Hours 3

Fundamentals of spectroscopic techniques for structure determination of organic molecules. Theory and application of IR, NMR, and MS in organic chemistry.

CH660 Adv Research Techniques Chem

Hours 1-6

Independent study in chemistry to learn advanced research techniques used in all areas of chemical research.

CH680 Initial Research Review

Hours 1

MS and PHD students present their initial research project progress to their thesis or dissertation committee, respectively.

CH681 Oral Candidacy Exam

Hours 1

PHD students prepare and present a third-year research report and defend an original research proposal in front of their dissertation committee.

Prerequisite(s): CH 680

CH699 Dissertation Research

Hours 1-12

No description available