

# CHEMISTRY (CY)

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## CY 105 General Chemistry I (3)

Prerequisite(s): EdReady placement score of MS 112 or higher.

Corequisite(s): CY 107.

Part I of a two-semester sequence. General chemistry for science majors, including basic principles and laws of chemistry. Topics include measurements, dimensional analysis, reaction and stoichiometry, periodicity, atomic structure, bonding and molecular structure, and an introduction to organic chemistry.

## CY 106 General Chemistry II (3)

Prerequisite(s): CY 105.

Corequisite(s): CY 108.

Part II of a two-semester sequence. Continuation of CY 105. Topics include states of matter, solutions, kinetics, equilibrium, acid-base theory, thermodynamics, and electrochemistry.

## CY 107 General Chemistry Laboratory I (1)

Corequisite(s): CY 105.

Basic principles of matter will be explored. Topics of experimentation include obtaining accurate measurements, identifying unknown substances from their physical and chemical properties, purifying matter, exploring gas laws, and performing an acid-base titration.

## CY 108 General Chemistry Laboratory II (1)

Corequisite(s): CY 106.

Topics of experimentation include qualitative analysis, exploring reaction rates, ionic equilibria, and synthesis.

## CY 115 Concepts of General Chemistry I (4)

Prerequisite(s): EdReady placement score of MS 112 or higher.

Part I of a two-semester sequence. General Chemistry for students who are not planning on taking any higher-level courses in chemistry. This course covers the basic principles and laws of chemistry is designed to cover a broad range of topics. Topics include measurements, the periodic table, ionic and covalent compounds, chemical reactions, energy changes, gases, liquids and solids, acids and bases and nuclear chemistry.

## CY 116 Concepts of General Chemistry II (4)

Prerequisite(s): CY 115.

Lecture 3 hours; Lab 3 hours. Part II of a two-semester sequence. General chemistry for students who are not planning on taking any higher-level courses in chemistry. This course is the second semester in the basic principles and laws of chemistry. Topics include organic molecules, functional groups, molecular configurations, aldehydes and ketones, carboxylic acids and derivatives, neurotransmitters, and metabolism.

## CY 231 Organic Chemistry I (4)

Prerequisite(s): CY 106.

Corequisite(s): CY 231 lab.

Part I of a two-semester sequence. Structure and properties of aliphatic hydrocarbons and their halo derivatives emphasizing nomenclature, isomerism, synthesis, reactions, mechanisms and applications.

## CY 232 Organic Chemistry II (4)

Prerequisite(s): CY 231.

Corequisite(s): CY 232 lab.

Part II of a two-semester sequence. Structure and properties of aromatic compounds, halides, carbonyl compounds, alcohols, ethers and amines, their nomenclature, synthesis, reactions, mechanisms, spectroscopy and applications.

## CY 321 Quantitative Analysis (4)

Prerequisite(s): CY 106 and CY 108.

Lecture 3 hours, Lab 3 hours. Theory and practice of gravimetric, volumetric, potentiometric, and colorimetric methods of analysis.

## CY 341 Physical Chemistry I (WI) (4)

Prerequisite(s): CY 106, MS 113 or higher, PHS 201 and PHS 202.

Lecture/3 hours. Lab/3 hours. An introduction to chemical thermodynamics, chemical kinetics, phase equilibria, and spectroscopy with emphasis on the applications of these topics to other fields of chemistry as well as everyday life. (Writing Intensive Course)

## CY 342 Physical Chemistry II (4)

Prerequisite(s): CY 341, MS 126.

Lecture/3 hours. Lab/3 hours. This course builds on the content learned in CY 341 with emphasis given to advanced chemical thermodynamics, quantum mechanics as applied to spectroscopy, and the foundations of computational physical chemistry.

## CY 362 Biochemistry I (WI) (4)

Prerequisite(s): CY 231.

Biochemical evolution, protein structure and function, flow of genetic information, enzymes, and enzyme kinetics. (Writing Intensive Course)

## CY 363 Biochemistry II (4)

Prerequisite(s): CY 232 and CY 362.

Metabolism, signal transduction, glycolysis and gluconeogenesis, citric acid cycle, oxidative phosphorylation, photosynthesis, glycogen and fatty acid metabolism.

## CY 411 Intermediate Inorganic Chemistry (4)

Prerequisite(s): CY 231.

Lecture 3 hours, Lab 3 hours. Fundamental topics in inorganic chemistry including atomic structure, chemical bonding, periodic relationships, acid-base theories, non-aqueous solvents, and reaction mechanisms.

## CY 413 Pharmacology (3)

Prerequisite(s): CY 231 and CY 232.

Pharmacology is the study of drug action, which includes the mechanism of action, therapeutic use, and adverse effects of pharmaceutical agents of natural or synthetic origin. As this is a chemistry course, we will also cover structure activity relationships (SAR) of drug molecules as it relates to the receptor, enzyme, or target. This course will cover the basics of pharmacological study, then survey specific disease states such as anticancer, bone mineral homeostasis, thyroid, gonadal hormone, and glucocorticoid agents. As such, this discipline incorporates and connects concepts from organic chemistry, biochemistry, anatomy and physiology, cell biology, and genetics and is therefore applicable to all health-related disciplines.

## CY 414 Medical Biochemistry (3)

Prerequisite(s): CY 362 and CY 363.

Medical biochemistry is a comprehensive course in human biochemistry where students will explore core biochemical concepts related to human diseases. We will focus on human medical biochemistry. Our goal is to learn the course concepts of biochemistry that apply to human health and disease and to cite specific examples of their application. The student will be able to analyze and evaluate the most common biochemistry cited in medical literature. Furthermore, these basics will facilitate further learning in biochemistry and the health sciences.

**CY 416 Forensic Chemistry (3)**

Prerequisite(s): CY 231 and CY 232.

This course approaches the challenges, methods, and analyses of forensic science from a fundamental, chemical perspective. Topics include drug analysis, arson investigation, questioned document analysis, and the analysis of paint and gunshot residue samples. This course is designed for students interested in pursuing careers in the Forensic Sciences and will help students develop approaches to understanding, correctly using, and further developing current chemical tools that are used in Forensic Sciences.

**CY 417 Macro-Molecular Modeling (3)**

Prerequisite(s): CY 362.

In this course, we will study how to model small chemical and biochemical systems. Molecular modeling of biological molecules, including proteins and their respective endogenous ligands, agonists and antagonists. Protein modeling includes the study of primary, secondary, tertiary, and quaternary structures. Ligand interactions are discovered through docking and pharmacophore modeling. Protein-ligand interactions are visualized in the 3-D space. Other biomolecules such as lipids and carbohydrates are also modeled and studied. The common feature of molecular modeling methods is the atomistic level description of the molecular systems. We will perform visualizations and simulations of these systems. We will also study how to output the data and graphics for reports and journal articles.

**CY 418 Enzymology (3)**

Prerequisite(s): CY 362.

Enzymology is an advanced biochemistry course where students will explore how enzymes are isolated. The course examines detailed enzyme mechanisms. Students will describe the formation of the enzyme-substrate complex and how enzymes bind substrates, the energetics of enzyme catalysis, and formation of the transition state. Students will learn how to analyze steady-state enzyme activity using substrate velocity curves and Michaelis-Menten kinetics. Students will define the competitive, non-competitive, uncompetitive, and irreversible inhibition along with other factors that alter enzyme activity, such as pH, which are important in human diseases as well as the design of pharmaceuticals.

**CY 419 Advanced Materials and Technology (3)**

Prerequisite(s): CY 231.

This is an introduction to polymeric materials and nanotechnology. This course will cover the fundamentals of polymer science including synthesis, characterization, properties, and applications of polymers. The course will also cover the fundamentals of nanotechnology including nanomaterials, nanofabrication, and the bio-nano interface.

**CY 421 Instrumental Analysis (4)**

Prerequisite(s): CY 106, CY 108, and CY 321.

Lecture/3 hours. Lab/3 hours. This course covers the general operating principles and techniques of the commonly used analytical instruments. It will provide the conceptual knowledge, experience, and skills related to a variety of instrumental analytical and separation techniques suitable for material in complex matrices and interfaces. Building on the foundations provided in CY 321, this course introduces students to advanced instrumentation and analytical skills.

**CY 430 Environmental Chemistry (4)**

Prerequisite(s): CY 232 and 321.

Lecture/3 hours; Lab/3 hours. Introductions to water, air, and soil quality and their measurements. Introduction to the problems, regulations, treatment, and ultimate disposal of hazardous and toxic waste materials. Spill clean-up, groundwater transport, land disposal, incineration and treatment technologies discussed.

**CY 435 Advanced Topics in Chemistry (3)**

Prerequisite(s): CY 232.

Advanced study of various topics in chemistry and chemistry related fields. This course is intended to be offered once per year, and topic selections will vary from year to year. See instructor. May be duplicated for credit for a total of 12 semester hours.

**CY 450 Neurochemistry (3)**

Prerequisite(s): CY 231 and CY 232.

Neurochemistry is the study of the signaling pathways and physiological outcomes resulting from the interaction of chemical molecules with the nervous system. This course will start with basic neuroanatomy as it relates to signaling and then progress through several prominent disease states.

**CY 471 Toxicological Chemistry (3)**

Prerequisite(s): CY 232.

Study of the principles of toxicology including identification of, characterization of, and risk from environmental exposures to toxic substances.

**CY 490 Internship (1)**

Prerequisite(s): Approval of instructor and department head.

This course gives the student an opportunity to gain valuable on-the-job experience with a firm, organization, or government agency. Each 1 hour of credit requires 30 hours of internship work. A total of 90 hours minimum is required for 3 credit for the semester. This course may be duplicated for credit for a total of 6 semester hours. Only 3 hours can count toward a Chemistry majors. Grades: Pass/Fail.

**CY 497 Chemistry Research (1)**

Prerequisite(s): Approval of department head.

The student is assigned a simple piece of fundamental research. May be duplicated for credit for a total of 3 semester hours. Grades: Pass/Fail.