

# CHEMISTRY (CHEM)

## **CHEM 100** **INTRODUCTION TO GENERAL CHEMISTRY** **4 UNITS**

Grade Only

Prerequisite: Elementary algebra proficiency, as determined through the Southwestern College Multiple Measures Process.

Lecture 3 hours, laboratory 3 hours

Offered: ALL

Provides fundamentals of inorganic chemistry, including bonding, nomenclature, stoichiometry, gas laws, acids and bases, equilibrium, solutions, and basic types of reactions. Introduces nuclear, organic, and environmental chemistry. [D; CSU; UC; C-ID CHEM 101]

## **CHEM 102** **GENERAL, ORGANIC, AND BIOLOGICAL CHEMISTRY** **5 UNITS**

Grade Only

Prerequisite: Elementary algebra proficiency, as determined through the Southwestern College Multiple Measures Process.

Lecture 4 hours, laboratory 3 hours

Offered: ALL

Introduces inorganic, organic, and biological chemistry as needed to understand human biochemistry, physiology, and pharmacology. Fulfills the chemistry requirement for majors in nursing, dental hygiene, medical laboratory technician, and other allied health fields. [D; CSU; UC]

## **CHEM 104** **ESSENTIAL MATH SKILLS FOR ENGINEERS AND SCIENTISTS** **6 UNITS**

Grade Only

Prerequisite: Intermediate algebra proficiency, as determined through the Southwestern College Multiple Measures Process.

Lecture 6 hours

Offered: FALL, SUMMER

Introduces and teaches mathematical techniques for engineers and scientists. Covers functions, dimensional analysis, inequalities, matrices, vectors, logarithms and curve fitting. Emphasizes functions and graphing. Includes graphic and numerical applications of trigonometry, circular and inverse functions, and practical applications of right and oblique triangles. Requires a CAS graphing calculator. [D; CSU; UC] (Same as: ENGR 104; PHYS 104)

## **CHEM 110** **ELEMENTARY ORGANIC AND BIOLOGICAL CHEMISTRY** **4 UNITS**

Grade Only

Prerequisite: CHEM 100, CHEM 102, CHEM 170, or CHEM 200, or equivalent.

Lecture 3 hours, laboratory 3 hours

Offered: ALL

Introduces organic and biological chemistry. Fulfills the chemistry requirements for majors in nursing, home economics, consumer science, and hazardous materials. [D; CSU; UC; C-ID CHEM 102]

## **CHEM 150** **INTRODUCTION TO CHEMICAL TECHNOLOGY** **2 UNITS**

Grade Only

Recommended Preparation: RDG 158 or equivalent or through the Southwestern College multiple measures placement processes.

Lecture 2 hours

Offered: ALL

Survey course about career and educational aspects of chemical technology. Topics include, but are not limited to, employment opportunities, job functions, case studies of workplace activities, hazardous materials and chemical safety, literature search, drug development, government regulations, and designations of Good Laboratory Practice (GLP) and Good Manufacturing Practice (GMP). [D; CSU]

## **CHEM 151** **INTRODUCTION TO FERMENTATION SCIENCE** **3 UNITS**

Pass/No Pass or Grade is Allowed

Recommended Preparation: Elementary algebra proficiency, as determined through the Southwestern College Multiple Measures Process; RDG 158 or equivalent or through the Southwestern College multiple measures placement processes.

Lecture 3 hours

Offered: ALL

Surveys the basic processes of biology which are common to all organisms with a focus on cellular functions and metabolism for understanding fermentation. Includes scientific method, biomolecules, cellular organization, structure, function, metabolism, and reproduction, genetics, evolution, and current events involving biology and the societal impacts of fermentation. Not intended for biology or chemistry majors. [D; CSU; UC] (Same as: BIOL 151)

## **CHEM 151L** **INTRODUCTION TO FERMENTATION SCIENCE LAB** **1 UNIT**

Pass/No Pass or Grade is Allowed

Recommended Preparation: Elementary algebra proficiency, as determined through the Southwestern College Multiple Measures Process; RDG 158 or equivalent or through the Southwestern College multiple measures placement processes.

Corequisite: CHEM 151 or BIOL 151 or BIOL 101 or BIOL 210 or BIOL 211 or CHEM 100 or CHEM 102 or CHEM 170 (may be taken previously).

Laboratory 3 hours

Offered: ALL

Provides laboratory experience to supplement BIOL 151/CHEM 151. Stresses the application of the Scientific Method and the Engineering Process in a laboratory setting employing project-based learning including: hypothesis generation and testing; troubleshooting; and process optimization as applied to the technically complex process of brewing beer. Introduction to safety, the quantitative use of common laboratory glassware, instrumentation and techniques that includes the use of; volumetric glassware and pipettes; hydrometers; top loading and analytical balances; colorimetric analyses; refractometers; and sterile techniques. [D; CSU; UC] (Same as: BIOL 151L)

**CHEM 160**  
**INTRODUCTORY BIOCHEMISTRY**  
**3 UNITS**

Pass/No Pass or Grade is Allowed

Prerequisite: CHEM 110 or CHEM 240 or equivalent.

Lecture 3 hours

Offered: SPRING

Introduces the fundamental principles of modern biological chemistry. Includes the structure, chemistry and metabolism of proteins, lipids, carbohydrates, and other biomolecules. [D; CSU; UC]

**CHEM 170**  
**PREPARATION FOR GENERAL CHEMISTRY**  
**4 UNITS**

Grade Only

Recommended Preparation: RDG 158 or equivalent or through the Southwestern College multiple measures placement processes.

Prerequisite: Intermediate algebra proficiency, as determined through the Southwestern College Multiple Measures Process.

Lecture 3 hours, laboratory 3 hours

Offered: ALL

Introduces general chemistry that serves to establish a framework of vocabulary, principles, concepts, laboratory techniques, and problem-solving skills to prepare the student to complete successfully the more intensive general chemistry sequence. [D; CSU; UC]

**CHEM 171**  
**INTRODUCTION TO RESEARCH AND SCIENTIFIC PRESENTATION**  
**3 UNITS**

Pass/No Pass or Grade is Allowed

Corequisite: CHEM 170 (may be taken previously).

Lecture 3 hours

Offered: ALL

Provides a step-by-step approach for getting started on a research project. Includes topics such as selecting a research advisor and project; how to mine the primary literature to help formulate a hypothesis; how to select the appropriate experimental approach and methodology; an introduction to design of experiments; how to analyze and interpret data; and an introduction to scientific presentations including posters, talks, and manuscript preparation. [D; CSU]

**CHEM 180**  
**COMPUTATIONAL METHODS IN CHEMISTRY**  
**2 UNITS**

Grade Only

Recommended Preparation: RDG 158 or equivalent or through the Southwestern College multiple measures placement processes.

Prerequisite: CHEM 170 or equivalent.

Lecture 2 hours

Offered: ALL

Students will employ a variety of computational methods to solve problems in chemistry. Computer techniques include spreadsheet applications, database management, and molecular structure drawing software, molecular visualization tools, introductory statistical, combinatorial, informatic applications, presentation software, and Internet usage. [D; CSU]

**CHEM 190**  
**CHEMICAL HEALTH AND SAFETY**  
**2 UNITS**

Grade Only

Recommended Preparation: RDG 158 or equivalent or through the Southwestern College multiple measures placement processes.

Prerequisite: CHEM 170 or equivalent.

Lecture 2 hours

Offered: ALL

Provides students with knowledge and skills necessary to work safely in a workplace where chemical and biological hazards exist. Covers such topics as evaluating laboratory risks, safety equipment, Material Safety Data Sheets (MSDS), government regulatory agencies, chemical toxicology, and safe chemical disposal practices. [D; CSU]

**CHEM 200**  
**GENERAL CHEMISTRY I**  
**5 UNITS**

Grade Only

Recommended Preparation: MATH 101, MATH 121, or MATH 244, or equivalent or through the Southwestern College multiple measures placement processes; RDG 158 or equivalent or through the Southwestern College multiple measures placement processes.

Prerequisite: CHEM 170 or equivalent; Intermediate algebra proficiency, as determined through the Southwestern College Multiple Measures Process.

Lecture 3 hours, laboratory 6 hours

Offered: ALL

Covers methods of chemistry, formulas and equations, chemical calculations, states of matter, periodic law, atomic structure and chemical bonding, gases, thermochemistry, equilibrium, and acids and bases. Laboratory stresses quantitative methods, including gravimetric analysis and titrimetry, use of instrumentation, including spectrophotometers, pH meters, multimeters, and error analysis. [D; CSU; UC; C-ID CHEM 110; C-ID CHEM 120S (with CHEM 210)]

**CHEM 210**  
**GENERAL CHEMISTRY II**  
**5 UNITS**

Grade Only

Recommended Preparation: RDG 158 or equivalent or through the Southwestern College multiple measures placement processes.

Prerequisite: CHEM 200 or equivalent; MATH 101, MATH 121, MATH 244, or MATH 250, or equivalent or through the Southwestern College multiple measures placement processes.

Lecture 3 hours, laboratory 6 hours

Offered: ALL

Includes equilibrium and acid-base reactions; liquids, solids, kinetics, electrochemistry, thermodynamics, coordination chemistry, nuclear chemistry, the elements and their properties; introduction to organic and biochemistry. Emphasizes quantitative and qualitative analysis, use of instrumentation including multimeters, spectrophotometers, Atomic Absorption Spectrometer (AA), and Fourier Transform Infrared Spectrometer (FTIR), laboratory reports, and discussion of error in the laboratory. [D; CSU; UC; C-ID CHEM 120S (with CHEM 200)]

**CHEM 240**  
**ORGANIC CHEMISTRY I**  
**5 UNITS**

Grade Only

Recommended Preparation: RDG 158 or equivalent or through the Southwestern College multiple measures placement processes.

Prerequisite: CHEM 210 or equivalent.

Lecture 3 hours, laboratory 6 hours

Offered: ALL

Introduces modern organic chemistry. Augments the study of organic compounds and their reactions via the use of Infrared Spectroscopy (IR) and Nuclear Magnetic Resonance Spectroscopy (NMR). [D: CSU; UC; C-ID CHEM 150; C-ID CHEM 160S (with CHEM 242)]

**CHEM 242**  
**ORGANIC CHEMISTRY II**  
**5 UNITS**

Grade Only

Recommended Preparation: RDG 158 or equivalent or through the Southwestern College multiple measures placement processes.

Prerequisite: CHEM 240 or equivalent.

Lecture 3 hours, laboratory 6 hours

Offered: SPRING

Builds upon topics learned in Organic Chemistry I (CHEM 240). Introduces properties of aromatic compounds, carbonyl compounds, amines, and alcohols. Includes extensive consideration of biological molecules such as carbohydrates, lipids, and proteins. [D; CSU; UC; C-ID CHEM 160S (with CHEM 240)]

**CHEM 244**  
**ORGANIC ANALYSIS AND SPECTROSCOPY**  
**2 UNITS**

Grade Only

Corequisite: CHEM 242.

Laboratory 6 hours

Offered: ALL

Provides laboratory experience in methods for the separation and identification of organic compounds. Includes isolation and identification of organic compounds by means of chromatographic techniques, derivations, and spectroscopic methods including nuclear magnetic resonance, infrared, and mass spectrometry. [D; CSU; UC]

**CHEM 250**  
**ANALYTICAL CHEMISTRY**  
**5 UNITS**

Grade Only

Recommended Preparation: RDG 158 or equivalent or through the Southwestern College multiple measures placement processes.

Prerequisite: CHEM 210 or equivalent; MATH 101 or MATH 121 or equivalent or through the Southwestern College multiple measures placement processes.

Lecture 3 hours, laboratory 6 hours

Offered: SPRING

Emphasizes the classical methods and theory of gravimetric and volumetric analyses. Introduces instrumental techniques, such as ultra violet-visible spectroscopy (UV-Vis), Fourier Transform Infrared Spectrometer (FTIR), gas chromatography-mass spectrometer (GC-MS), high performance liquid chromatography (HPLC), atomic absorption, and selected electrical methods. [D; CSU; UC]

**CHEM 266**  
**BIOMEDICAL WET LAB EXPERIENCE**  
**1 UNIT**

Grade Only

Corequisite: CHEM 100 or CHEM 170 (may be taken previously); CHEM 102 or CHEM 110 (may be taken previously); BIOL 260 (may be taken previously); BIOL 261 (may be taken previously); BIOL 265 (may be taken previously).

Laboratory 3 hours

Offered: ALL

Provides wet lab experiences to support chemistry, human anatomy, human physiology and general microbiology prerequisite courses for majors pursuing allied health professions. Intended for students who took chemistry and biology prerequisite courses through distance education lacking a wet lab component. [D; CSU; UC] (Same as: BIOL 266)

**CHEM 299**  
**INDEPENDENT STUDY**  
**1-3 UNITS**

Pass/No Pass or Grade is Allowed

Limitation on Enrollment: Eligibility for independent study.

Lecture 3 hours

Offered: ALL

Individual study or research in some area of chemistry of particular interest to the student and not included in regular courses of the college. [D; CSU; \*\*UC] (\*\*UC Limitation: credit for variable topics courses is given only after a review of the scope and content of the courses by the enrolling UC campus.)