CHEM G130: PREPARATION FOR GENERAL CHEMISTRY

Item	Value
Curriculum Committee Approval Date	12/03/2024
Top Code	190500 - Chemistry, General
Units	4 Total Units
Hours	108 Total Hours (Lecture Hours 54; Lab Hours 54)
Total Outside of Class Hours	0
Course Credit Status	Credit: Degree Applicable (D)
Material Fee	Yes
Basic Skills	Not Basic Skills (N)
Repeatable	No
Open Entry/Open Exit	No
Grading Policy	Standard Letter (S), • Pass/No Pass (B)
Local General Education (GE)	• Area 5 Natural Sciences (GB1)
California General Education Transfer Curriculum (Cal-GETC)	• Cal-GETC 5A Physical Science (5A) • Cal-GETC 5C Laboratory Activity (5C)
Intersegmental General Education Transfer Curriculum (IGETC)	• IGETC 5A Physical Science (5A) • IGETC 5C Laboratory Activity (5C)
California State University General Education Breadth (CSU GE-Breadth)	• CSU B1 Physical Science (B1) • CSU B3 Laboratory Activity (B3)

Course Description

This course is an introduction to the principles and calculations of chemistry and practice in basic laboratory techniques. It is designed specifically for students planning to take the general chemistry sequence. PREREQUISITE: Course taught at the level of intermediate algebra or appropriate math placement. Transfer Credit: CSU; UC: Credit Limitations: CHEM G110 and CHEM G130 combined: maximum credit, 1 course; No credit for CHEM G130 if taken after CHEM G180. C-ID: CHEM 101.**C-ID:** CHEM 101.

Course Level Student Learning Outcome(s)

1. Course Outcomes
2. Explain the principles of basic atomic structure, the modern model of the atom, chemical periodicity, the mole, chemical equations, stiochiometry, molecular geometry, solutions, elementary acid/base concepts, and gas laws.
3. Use the language, symbols, and nomenclature of inorganic chemistry correctly in chemistry problems and equations.
4. Solve mathematical chemistry problems using calculations involving grams, moles, particles of elements and compounds.
5. Perform mathematical operations using the standard units of scientific measurement and significant figures.

Course Objectives

- 1. Develop mathematical skills necessary for solving problems related to chemistry.
- 2. Develop the principles of basic atomic structure, chemical periodicity, the mole, chemical equations, stoichiometry, molecular geometry, solutions, elementary acid/base concepts, and gas laws.
- 3. Use the language, symbols, and nomenclature of inorganic chemistry.
- 4. Develop the manipulative skills, in the lab, necessary to safely and successfully complete chemical experiments.
- 5. Demonstrate the connection between lecture and laboratory activities.

Lecture Content

Mathematical Skills Significant figures Recording measurements Exponential (scientific) notation Metric and United States Customary System (USCS) system units and conversions Dimensional analysis Correct use of scientific calculator Temperature scales and conversions Fundamental Chemical Concepts Matter and Energy States of matter Physical and chemical properties and changes Density Pure substances and mixtures Types of energy Conservation laws Exothermic and endothermic terminology Basic atomic structure Dalton's atomic theory Subatomic particles The nuclear atom Isotopes Atomic mass Ions Calculation of protons, neutrons, and electrons for neutral atoms and ions Chemical nomenclature Formulas of elements Formulas of compounds Naming binary molecular compounds Writing formulas of binary molecular compounds Naming acids Writing formulas for acids Naming ionic compounds Writing formulas of ionic compounds The mole concept The mole Molecular mass and formula mass Molar mass Conversion among mass, moles, and number of units Percentage composition Empirical and molecular formulas Chemical Equations Evidence of chemical change Balancing chemical equations Interpreting chemical equations Writing chemical equations Categories of chemical equations Ionic ve rsus molecular solution species Strong and weak acids Writing net ionic equations Elementary acid/base concepts Arrhenius definition of acids and bases Strong and weak acids Reactions of acids and bases Stoichiometry Conversion factors from chemical equations Mass-mass stoichiometry calculations Percent yield calculations Limiting reactant–concept and calculations Quantum mechanical theory Electromagnetic radiation The Bohr atom Quantum mechanical atom Electron configurations of neutral atoms and ions Valence electrons The periodic table and chemical periodicity Elemental symbols Names of rows and columns Ionization energy (IE) Trends in IE Trends in atomic size Metals and non-metal Chemical bonding Lewis theory with ionic bonds Lewis theory with covalent (molecular) bonds Drawing Lewis diagrams Drawing multiple bonds Introduction to resonance Valence Shell Electron Pair Repulsion (VSEPR) theory Drawing VSEPR diagrams Polar and non-polar covalent bonds Polar and non-polar molecules Solution chemistry Solution terminology and characteristics Solubility Percentage by mass Molarity Dilution Solution stoichiometry Titration Gas Laws The kinetic molecular theory of gases Gas measurements Charles Law Boyle s Law Combined gas law Avogadro s Law Ideal Gas Law Gas stoichiometry Daltons law of partial pressure - introduction

Lab Content

Lab equipment Top-loading balance Graduated cylinders Beakers Erlenmeyer flasks Burets Bunsen burner Crucible Ring stand Measurement Recording measurements and significant figures

Calculating results and significant figures Qualitative analysis Identifying reaction types and products Precipitation Acid-base Redox Flame tests Quantitative analysis Density determination Acid-base titration Gravimetric determination

Method(s) of Instruction

- Lecture (02)
- DE Live Online Lecture (02S)
- DE Online Lecture (02X)
- Lab (04)
- DE Live Online Lab (04S)
- DE Online Lab (04X)

Reading Assignments

Textbook and laboratory manual

Writing Assignments

Quizzes and exams include problems which must be solved out step-by-step, as well as short essay questions. Laboratory experiments are evaluated both for accuracy of data (laboratory skills demonstration) and for written anwers to questions covering the experiment.

Out-of-class Assignments

Homework

Demonstration of Critical Thinking

Students must clearly show the path of reasoning in the setup of the problem for full credit. In lab, complete essay-style answers to questions requiring interpretation of data.

Required Writing, Problem Solving, Skills Demonstration

Quizzes and exams include problems which must be solved out step-by-step, as well as short essay questions. Laboratory experiments are evaluated both for accuracy of data (laboratory skills demonstration) and for written anwers to questions covering the experiment.

Eligible Disciplines

Chemistry: Master's degree in chemistry OR bachelor's degree in chemistry or biochemistry AND master's degree in biochemistry, chemical engineering, chemical physics, physics, molecular biology, or geochemistry OR the equivalent. Master's degree required.

Textbooks Resources

1. Required Hein, M., Arena, S., Willard, C. Foundations of College Chemistry, 16th ed. John Wiley Sons, Inc., 2021 Rationale: This is the course text.

Manuals Resources

1. Grimes, C. Wilcox, J.. Chemistry 130 Laboratory Manual (Classic), Golden West College , 05-01-2019