COURSE OUTLINE OF RECORD

Number: CHEM G130   TITLE: Preparation for General Chemistry

ORIGINATOR: James Almy   EFF TERM: Spring 2019
FORMERLY KNOWN AS:

DATE OF OUTLINE/REVIEW: 09-26-2018
CROSS LISTED COURSE:

TOP NO: 1905.00
CID: CHEM 101

SEMESTER UNITS: 4.0
HRS LEC: 72.0   HRS LAB: 54.0   HRS OTHER: 0.0
CONTACT HRS TOTAL: 126.0
STUDY NON-CONTACT HRS RECOMMENDED: 144.0

CATALOG 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 Chemistry G180 (General Chemistry A). UC Credit limitations: Maximum credit of one course for Chemistry G110 and G130; no credit if taken after Chemistry G180.

JUSTIFICATION FOR COURSE:

Added prerequisites MATH G030 and MATH G040 to comply with AB 705

PREREQUISITES:

- GWC Math Placement Level of 100 or higher.
- MATH G030: Intermediate Algebra with a minimum grade of C or better or concurrent enrollment
- MATH G040: Accelerated Elementary and Intermediate Algebra with a minimum grade of C or better or concurrent enrollment
- OCC Math Placement Level of 40 or higher.
- MATH A010: Elementary Algebra with a minimum grade of C or better
- MATH A045: Combined Elementary & Intermediate Algebra with a minimum grade of C or better
- CCC Math Placement Level of 50 or higher.
- MATH C010: Elementary Algebra with a minimum grade of C or better
- MATH C045: Combined Elementary and Intermediate Algebra with a minimum grade of C or better

COREQUISITES:

ADVISORIES:

ASSIGNED DISCIPLINES:

Chemistry

MATERIAL FEE: Yes [X] No [ ] Amount: $8.00
CREDIT STATUS: Noncredit [ ] Credit - Degree Applicable [X] Credit - Not Degree Applicable [ ]
GRADING POLICY: Pass/No Pass [ ] Standard Letter [X] Not Graded [ ] Satisfactory Progress [ ]
OPEN ENTRY/OPEN EXIT: Yes [ ] No [X]
TRANSFER STATUS: CSU Transferable[ ] UC/CSU Transferable[X] Not Transferable[ ]
BASIC SKILLS STATUS: Yes [ ] No [X]  LEVELS BELOW TRANSFER: Not Applicable
CALIFORNIA CLASSIFICATION CODES: Y - Not Applicable
NON CREDIT COURSE CATEGORY: Y - Not applicable, Credit Course
OCCUPATIONAL (SAM) CODE: E
REPEATABLE ACCORDING TO STATE GUIDELINES: No [X] Yes [ ] NUMBER REPEATS: 
REQUIRED FOR DEGREE OR CERTIFICATE: No [ ] Yes [X]
Liberal Arts: Emphasis in Science (Associate in Arts)

GE AND TRANSFER REQUIREMENTS MET:
IGETC Area 5: Physical and Biological Sciences
   5A: Physical Science
      x
      x
CSU GE Area B: Scientific Inquiry and Quantitative Reasoning
   B1 - Physical Science
   B3 - Laboratory Sciences

COURSE LEVEL STUDENT LEARNING OUTCOME(S) Supported by this course:

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

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. In lab, develop the manipulative skills necessary to safely and successfully complete chemical experiments.
5. Demonstrate an understanding of the connection between lecture and laboratory activities.

COURSE CONTENT:

   LECTURE CONTENT:
   A. Mathematical Skills
      1. Significant figures
      2. Recording measurements
      3. Exponential (scientific) notation
      4. Metric and United States Customary System (USCS) system units and conversions
      5. Dimensional analysis
      6. Correct use of scientific calculator
      7. Temperature scales and conversions
   B. Fundamental Chemical Concepts
1. Matter and Energy
   a. States of matter
   b. Physical and chemical properties and changes
   c. Density
   d. Pure substances and mixtures
   e. Types of Energy
   f. Conservation laws
   g. Exothermic and endothermic terminology

2. Basic atomic structure
   a. Dalton's atomic theory
   b. Subatomic particles
   c. The nuclear atom
   d. Isotopes
   e. Atomic mass
   f. Ions
   g. Calculation of protons, neutrons, and electrons for neutral atoms and ions

3. Chemical nomenclature
   a. Formulas of elements
   b. Formulas of compounds
   c. Naming binary molecular compounds
   d. Writing formulas of binary molecular compounds
   e. Naming acids
   f. Writing formulas for acids
   g. Naming ionic compounds
   h. Writing formulas of ionic compounds

4. The mole concept
   a. The mole
   b. Molecular mass and formula mass
   c. Molar mass
   d. Conversion among mass, moles, and number of units
   e. Percentage composition
   f. Empirical and molecular formulas

5. Chemical Equations
   a. Evidence of chemical change
   b. Balancing chemical equations
   c. Interpreting chemical equations
   d. Writing chemical equations
   e. Categories of chemical equations
   f. Ionic versus molecular solution species
   g. Strong and weak acids
   h. Writing net ionic equations

6. Elementary acid/base concepts
   a. Arrhenius definition of acids and bases
   b. Strong and weak acids
   c. Reactions of acids and bases

7. Stoichiometry
   a. Conversion factors from chemical equations
   b. Mass-mass stoichiometry calculations
   c. Percent yield calculations
   d. Limiting reactant--concept and calculations

8. Quantum mechanical theory
   a. Electromagnetic radiation
   b. The Bohr atom
   c. Quantum mechanical atom
   d. Electron configurations of neutral atoms and ions
e. Valence electrons
9. The periodic table and chemical periodicity
   a. Elemental symbols
   b. Names of rows and columns
   c. Ionization energy (IE)
   d. Trends in IE
   e. Trends in atomic size
   f. Metals and non-metal
10. Chemical bonding
    a. Lewis theory with ionic bonds
    b. Lewis theory with covalent (molecular) bonds
    c. Drawing Lewis diagrams
    d. Drawing multiple bonds
    e. Introduction to resonance
    f. Valence Shell Electron Pair Repulsion (VSEPR) theory
    g. Drawing VSEPR diagrams
    h. Polar and non-polar covalent bonds
    i. Polar and non-polar molecules
11. Solution chemistry
    a. Solution terminology and characteristics
    b. Solubility
    c. Percentage by mass
    d. Molarity
    e. Dilution
    f. Solution stoichiometry
    g. Titration
12. Gas Laws
    a. The kinetic molecular theory of gases
    b. Gas measurements
    c. Charles’ Law
    d. Boyle’s Law
    e. Combined gas law
    f. Avogadro’s Law
    g. Ideal Gas Law
    h. Gas stoichiometry
    i. Dalton’s law of partial pressure - introduction

LABORATORY CONTENT:

Laboratory
1. Develop manipulative skills for safe and successful chemical experimentation
   a. Use of the top-loading balance
   b. Use of volume measuring equipment (graduated cylinders, beakers, flask, burets)
   c. Use of the Bunsen burner
   d. Use of general lab equipment (crucibles, files, clamps, ring stands, etc.)
2. Use significant figures both in making measurements and in calculations of laboratory data.
3. Understand the difference between qualitative and quantitative determinations, and perform both
   types of analysis.
4. Use laboratory activities to reinforce chemical concepts learned in lecture (i.e., density, solubility
   rules, activity series of metals).

METHODS OF INSTRUCTION:

   A. Lecture:
   B. Lab:
   C. Independent Study:

INSTRUCTIONAL TECHNIQUES:
COURSE ASSIGNMENTS:
  Reading Assignments
  Textbook and laboratory manual

  Out-of-class Assignments
  Online homework

  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 answers to questions covering the experiment.

METHODS OF STUDENT EVALUATION:
  Midterm Exam
  Final Exam
  Short Quizzes
  Skills Demonstration

  Demonstration of Critical Thinking:
  Problems given on quizzes and exams are not exact duplicates of problems already demonstrated in class. 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 answers to questions covering the experiment.

TEXTS, READINGS, AND RESOURCES:
  TextBooks:

  Manuals:

LIBRARY:
  Adequate library resources include:
  Comments:

Attachments:
  Attached Files