Course Outline of Record

Number: CHEM G110

Title: Introduction to Chemistry

Originator: James Almy

Eff Term: Spring 2019

Formerly Known As:

Cross Listed Course:

Semester Units: 5.0

Hrs Lec: 54.0

Hrs Lab: 72.0

Hrs Other: 0.0

Contact Hrs Total: 126.0

Study Non-Contact Hrs Recommended: 108.0

Catalog Description:

An introduction to some of the basic principles of inorganic, organic and biochemistry. Lectures, demonstrations and laboratories are integrated into a learning system equivalent to three hours lecture, four hours lecture-laboratory a week. 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.
- or MATH G030: Intermediate Algebra with a minimum grade of C or better or concurrent enrollment
- or MATH G040: Accelerated Elementary and Intermediate Algebra with a minimum grade of C or better or concurrent enrollment
- or OCC Math Placement Level of 30 or higher.
- or MATH A010: Elementary Algebra with a minimum grade of C or better
- or MATH A045: Combined Elementary & Intermediate Algebra with a minimum grade of C or better
- or CCC Math Placement Level of 50 or higher.
- or MATH C010: Elementary Algebra with a minimum grade of C or better
- or MATH C045: Combined Elementary and Intermediate Algebra with a minimum grade of C or better

Corequisites:

Advisories:

Assigned Disciplines:

Chemistry

Material Fee: Yes [ ] No [X] Amount: $0.00

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

1. Solve unit conversion and mathematical problems related to chemical processes.
2. Apply the atomic theory to create electron configurations, Lewis structures, and three-dimensional drawings of molecules.
3. Demonstrate inorganic and organic chemistry nomenclature rules.
4. Interpret the conditions of typical organic chemistry reactions to predict the reaction products.
5. Recall facts about important biomolecules and their biochemical processes.
6. Demonstrate the use of laboratory equipment to make accurate measurements of mass, volume, and temperature.
7. Explain experimental observations by relating them to relevant lecture topics to demonstrate the connection between the two.
8. Interpret and analyze laboratory data in such a way as to come to an appropriate conclusion, such as correctly identifying an unknown substance.

COURSE OBJECTIVES:

1. Recall chemical terminology.
2. Demonstrate how to convert units for various types of chemical measurements.
3. Demonstrate how to express numbers in scientific notation and to the correct significant figures.
4. Explain how the periodic table works and the information it contains.
5. Identify the different types of matter and their associated properties.
6. Illustrate how to balance equations for inorganic chemical reactions and interpret how these balanced equations are used to solve stoichiometry problems.
7. Infer the shape of a molecule using VSEPR theory.
8. Solve problems using the mathematical relationships associated with the gas laws, solutions, thermodynamics, kinetics, and equilibrium.
9. Demonstrate how to name, draw the structure, and predict the reactions of typical organic compounds.

10. Recall the names, structures, and biochemical pathways of important biomolecules.
11. Demonstrate proper chemical safety practices.
12. Demonstrate how to perform accurate measurements of mass, volume, and temperature.
13. Interpret data to draw a conclusion.
14. Analyze laboratory observations.

**COURSE CONTENT:**

**LECTURE CONTENT:**

A. Measurement, Numbers, and Units
   1. Scientific method
   2. Measurement, metric units, scientific notation, and significant figures
   3. Unit conversions (metric, English, and temperature)
   4. Density

B. Matter, Atomic Structure, and the Periodic Table
   1. Types of matter (states of matter, elements, compounds, and mixtures)
   2. Composition of the atom
   3. Organization of the periodic table
   4. Chemical symbols (atomic number, element symbol, mass number, and ion charge)

C. Bonding, Molecular Shape, and Molecular Polarity
   1. Chemical bonding (ionic and covalent) and Lewis structures
   2. Nomenclature and formulas of ionic and covalent compounds
   3. Molecular shape (VSEPR theory) and polarity

D. Amounts in Chemical Reactions and Gases
   1. Chemical equations (writing and balancing) and types of chemical reactions
   2. The mole, Avogadro's number, and stoichiometry
   3. Gas laws

E. Matter, Solutions, Energy, Rate, and Equilibrium
   1. Intermolecular forces
   2. Solutions (concentration, dilution, and colligative properties)
   3. Thermodynamics (exothermic versus endothermic reactions and calorimetry)
   4. Kinetics (reaction rates, activation energy, and kinetic theory of gases)
   5. Chemical equilibrium

F. Acid-Base and Nuclear Reactions
   1. Acid-base definitions (Arrhenius and Bronsted-Lowry)
   2. The pH scale
   3. Titrations
   4. Buffers
   5. Types of radioactivity and equations for nuclear reactions
   6. Half-life calculations

G. Organic Chemistry of Common Functional Groups
   1. Structural formulas of organic compounds
   2. Structural isomers and stereoisomers
   3. Nomenclature, physical properties, and simple reactions of common functional groups:
      a. Alkanes
      b. Alkenes
      c. Alkynes
      d. Alkyl halides
      e. Aromatic compounds
      f. Alcohols
      g. Ethers
      h. Aldehydes
i. Ketones
j. Carboxylic acids
k. Carboxylic acid derivatives

H. Organic Chemistry, Structure, and Pathways of Important Biomolecules
   1. Polymers
   2. Carbohydrates
   3. Lipids
   4. Cell membrane structure
   5. Amino acids and proteins
   6. Enzymes
   7. Metabolic pathways
   8. DNA and RNA
   9. Nutrition (vitamins, minerals, and calories)

LABORATORY CONTENT:

A. Physical Properties of Matter
   1. Density
   2. Chromatography or separations
   3. Identification of an unknown substance based on physical property data (e.g., melting point)
   4. Molecular geometry modeling activity

B. Chemical Properties of Matter
   1. Identification of an unknown substance based on chemical reaction data (e.g., functional group tests)
   2. Acid-base titration

C. Chemical Laws
   1. Gas laws: Charles's, Boyle's, or Avogadro's Law
   2. Thermodynamics: calorimetry

D. Biochemistry
   1. Observe biochemical processes (e.g., protein denaturation and enzyme catalysis)

E. Critical Thinking Exercises
   1. Essay questions related to lab data

METHODS OF INSTRUCTION:

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

INSTRUCTIONAL TECHNIQUES:

COURSE ASSIGNMENTS:
Reading Assignments
   Textbook and the syllabus.

Out-of-class Assignments
   None required.

Writing Assignments
   TBD

METHODS OF STUDENT EVALUATION:
Midterm Exam
Final Exam
Short Quizzes
Written Assignments
Objective Examinations
Report
Problem Solving Exercises
Skills Demonstration

**Demonstration of Critical Thinking:**

Apply chemical theories to novel situations.

**Required Writing, Problem Solving, Skills Demonstration:**

1. Solve mathematical problems related to theory. 2. Demonstrate good laboratory procedures.

**TEXTS, READINGS, AND RESOURCES:**

**TextBooks:**


**Manuals:**


**LIBRARY:**

Adequate library resources include:

**Comments:**

**Attachments:**

[Attached Files]