

Today's Date: 01/26/2016

Course ID: CHEM V01A
CC Approval: 12/02/2014
Effective Term: Fall 2015

Ventura College
COURSE OUTLINE OF RECORD

I. Course Information (Printed catalog data elements)

A. Discipline:

Chemistry

B. Course ID:

CHEM V01A

C. Course Title: General Chemistry I

D. Units: 3.00

E. Hours:

Lecture/wk: 3.00

Total Semester Contact Hours (based on 17.5 week semester): 52.50

F. Prerequisite(s):

CHEM V20 and CHEM V20L or high school chemistry with grades of C or better; and MATH V03 or MATH V13B or 1 year of high school intermediate algebra (Algebra II) with grades of C or better

G. Corequisite(s):

None

H. Recommended preparation:

None

I. Enrollment Limitation:

None

J.

Description:

This course is an introduction to matter and energy, atomic structure, nomenclature, chemical equations, stoichiometry, gases, thermochemistry, quantum chemistry, bonding, molecular geometry, oxidation-reduction, liquids and solids, and solutions.

K. Former course ID: Chem 1A

L. C-ID: CHEM 110, CHEM 120S

M. Transfer Status:

CSU Recommended

UC Recommended

II. Course Objectives

- Upon successful completion of this course, the student will be able to demonstrate the following measurable skills and abilities:

A. Apply the scientific method to chemistry data and problems, including hypothesis development, testing, and evaluation.

- B. Write balanced chemical equations including net ionic and oxidation-reduction equations.
- C. Assess the different models of the atom.
- D. Use standard nomenclature and notation.
- E. Calculate the formula weight, mass percentages, and empirical formula.
- F. Evaluate mole and limiting reactant stoichiometry calculations.
- G. Analyze the ideal gas law and predict deviations from ideal behavior.
- H. Calculate enthalpies of reaction using bond energies.
 - I. Determine the relative strengths of acids, bases, and electrolytes.
 - J. Diagram hybridization, geometry, and polarity for simple molecules.
- K. Evaluate bonding in compounds and ions.
- L. Differentiate between solids, liquids, gases, and phase changes.
- M. Evaluate metallic bonding and semiconductors.
- N. Analyze concentration units for solutions and solving solution stoichiometry problems.
- O. Evaluate colligative properties of solutions.
- P. Carry out various calculations involving particles, moles, grams, unit conversions, scientific notation, multi-variable equations, etc., using a scientific calculator.

III. Course Content

- A. Introduction: matter and measurement
 - 1. The study of chemistry
 - 2. Classifications of matter
 - 3. Properties of matter
 - 4. Units of measurement
 - 5. Uncertainty in measurement
 - 6. Dimensional analysis
- B. Atoms, molecules, and ions
 - 1. The atomic theory of matter
 - 2. The discovery of atomic structure
 - 3. The modern view of atomic structure
 - 4. Atomic weights
 - 5. The periodic table
 - 6. Molecules and molecular compounds
 - 7. Ions and ionic compounds
 - 8. Naming inorganic compounds
 - 9. Some simple organic compounds
- C. Chemical reactions and reaction stoichiometry
 - 1. Chemical equations
 - 2. Simple patterns of chemical reactivity
 - 3. Formula weights
 - 4. Avogadro's number and the mole
 - 5. Empirical formulas from analyses
 - 6. Quantitative information from balanced equations
 - 7. Limiting reactants
- D. Reactions in aqueous solution
 - 1. General properties of aqueous solutions
 - 2. Precipitation reactions
 - 3. Acids, bases, and neutralization reactions
 - 4. Oxidation-reduction reactions
 - 5. Concentrations of solutions
 - 6. Solution stoichiometry and chemical analysis
- E. Gases
 - 1. Characteristics of gases
 - 2. Pressure

3. The gas laws
 4. The ideal-gas equation
 5. Further applications of the ideal-gas equation
 6. Gas mixtures and partial pressures
 7. The kinetic-molecular theory of gases
 8. Molecular effusion and diffusion
 9. Real gases: deviations from ideal behavior
- F. Thermochemistry
1. Energy
 2. The first law of thermodynamics
 3. Enthalpy
 4. Enthalpies of reaction
 5. Calorimetry
 6. Hess's law
 7. Enthalpies of formation
 8. Foods and fuels
- G. Electronic structure of atoms
1. The wave nature of light
 2. Quantized energy and photons
 3. Line spectra and the Bohr model
 4. The wave behavior of matter
 5. Quantum mechanics and atomic orbitals
 6. Representations of orbitals
 7. Many-electron atoms
 8. Electron configurations
 9. Electron configurations and the periodic table
- H. Periodic properties of the elements
1. Development of the periodic table
 2. Effective nuclear charge
 3. Sizes of atoms and ions
 4. Ionization energy
 5. Electron affinity
 6. Metals, nonmetals, and metalloids
 7. Trends for group 1A and group 2A metals
 8. Trends for selected nonmetals
- I. Basic concepts of chemical bonding
1. Lewis symbols and the octet rule
 2. Ionic bonding
 3. Covalent bonding
 4. Bond polarity and electronegativity
 5. Drawing Lewis structures
 6. Resonance structures
 7. Exceptions to the octet rule
 8. Strengths and lengths of covalent bonds
- J. Molecular geometry and bonding theories
1. Molecular shapes
 2. The VSEPR model
 3. Molecular shape and molecular polarity
 4. Covalent bonding and orbital overlap
 5. Hybrid orbitals
 6. Multiple bonds
 7. Molecular orbitals

- 8. Period 2 diatomic molecules
- K. Liquids and intermolecular forces
 - 1. A molecular comparison of gases, liquids, and solids
 - 2. Intermolecular forces
 - 3. Select properties of liquids
 - 4. Phase changes
 - 5. Vapor pressure
 - 6. Phase diagrams
 - 7. Liquid crystals
- L. Properties of solutions
 - 1. The solution process
 - 2. Saturated solutions and solubility
 - 3. Factors affecting solubility
 - 4. Expressing solution concentration
 - 5. Colligative properties
 - 6. Colloids

Total Lecture Content Hours: 52.50

IV. Lab Content:

Total Lab Content Hours:

V. Assignments

A. **Representative In-class Assignments** that develop critical thinking (required for degree applicable courses) may include, but are not limited to:

Student Activities:	Write composition(s) and/or report(s) and/or essay(s)	Write research paper(s) and/or term paper(s) and/or other paper(s)	Solve computational and/or symbolic problems	Conduct and experiment or survey	Engage in analytical discussions	Prepare oral presentations	Develop skills in performance/activities	Create and analyze projects	Other (specify below)
Critical Thinking Skills	Student Activities involved in each skill								
Evaluating	✓		✓		✓				
Appraising and assessing	✓		✓		✓				
Justifying	✓		✓		✓				
Synthesizing	✓		✓		✓				
Developing and formulating	✓		✓		✓				
Analyzing	✓		✓		✓				
Solv problems	✓		✓		✓				
Applying principles	✓		✓		✓				
Comprehending concepts	✓		✓		✓				
Identifying knowledge	✓		✓		✓				

Other (describe):
Comments:

B. Representative Out-of-class Assignments

Reading: Read approximately 40 pages per week from text.
Writing: Minimum 1 page per week of essay answers to conceptual questions from the text.
Online-Homework (Mastering Chemistry)
Problem solving: Approximately 20 problems per week. Online-Homework (Mastering Chemistry)
Total Outside Assignments Hours: 105.00

VI. Representative Instructional Modes -

Lecture
Audio Visual Presentations
Collaborative Group Work
Computer-aided Presentation/Assignments
Demonstrations
Lecture/Discussion
Problem Solving

VII. Evaluation Methods - Substantively related to the course objectives.

A. Writing.

essay exam(s)
written homework
other (specify) : online homework

B. Problem Solving.

 Computational or non-computational problem-solving demonstrations, including:

exam(s)
quiz(zes)
homework problem(s)
other (specify) : online homework

C. Skills demonstrations.

 Including:

active and informed participation
performance exam(s)

D. Objective examinations.

 Including:

multiple choice
true/false
matching items
completion
other (specify) : written calculations; written explanations/short essay; ability to properly use scientific calculator in problem-solving

VIII. Textbooks

List representative textbooks, manuals, and other instructional materials/publications, including those materials to be put in the Library/LRC(Learning Resources Center).

Author(s)	Title(s)	Publisher(s)	Date(s)
Brown, T.L. & LeMay, H.E.	Chemistry: The Central Science	Prentice Hall	2015

Other appropriate publications/instructional materials such as representative recommended readings, repertoire, non-print media (eg., websites, audio/visual recordings), and software.

Software

Software Title	Edition	Publisher
Mastering Chemistry	2015	Pearson Education

Other

Other Appropriate Publications:

Discipline-specific websites: Yes

IX. Minimum Qualifications

Chemistry (Masters Required)

X. Student Learning Outcomes

CSLO-1 Balance chemical equations and solve general chemistry problems by applying the scientific method including developing hypotheses, hypotheses testing and evaluation.

CSLO-2 Calculate quantities involving chemical equations including using chemical symbols, IUPAC nomenclature, balancing reactions, and stoichiometry.

CSLO-3 Use chemical concepts such as enthalpy, VSEPR theory, changes of state, and colligative properties to determine the physical properties of substances.