Course Outline

COURSE: CHEM 1A  DIVISION: 10  ALSO LISTED AS:

TERM EFFECTIVE: Fall 2016  CURRICULUM APPROVAL DATE: 11/23/2015

SHORT TITLE: GEN CHEMISTRY L/L

LONG TITLE: General Chemistry

<table>
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<th>Units</th>
<th>Number of Weeks</th>
<th>Type</th>
<th>Contact Hours/Week</th>
<th>Total Contact Hours</th>
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<td>5</td>
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<td>Lecture:</td>
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<td>Lab:</td>
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COURSE DESCRIPTION:

This is the first semester of a year-long general chemistry course designed for science, engineering and pre-professional majors. Topics include properties of matter, atomic structure, the Periodic Table, stoichiometry, elements and compounds, bonding, molecular structure, chemical reactions, states of matter, as well as the properties of gases and solutions. (C-ID: CHEM 110) (C-ID: CHEM 120S: Chem 1A + Chem 1B)

ADVISORY: Eligible for English 250 and English 260. PREREQUISITE: Chemistry 30A with a grade of 'C' or better, or high school chemistry with a grade of 'B' or better completed within the last five years, and Mathematics 233 with a grade of 'C' or better.

PREREQUISITES:

Completion of CHEM 30A, as UG, with a grade of C or better.

AND (Completion of MATH 233, as UG, with a grade of C or better.

OR

Completion of MATH 233B, as UG, with a grade of C or better.

OR

Completion of MATH 235, as UG, with a grade of C or better.

OR

Completion of MATH 240, as UG, with a grade of C or better.

OR

Completion of MATH 242, as UG, with a grade of C or better.

OR

Completion of MATH 3, as UG, with a grade of C or better.

OR

Completion of MATH 5, as UG, with a grade of C or better.

OR

Completion of MATH 6, as UG, with a grade of C or better.
OR
Completion of MATH 7, as UG, with a grade of C or better.
OR
Completion of MATH 8A, as UG, with a grade of C or better.
OR
Completion of MATH 8B, as UG, with a grade of C or better.
OR
Completion of MATH 12, as UG, with a grade of C or better.
OR
Completion of MATH 14, as UG, with a grade of C or better.
OR
Completion of MATH 1A, as UG, with a grade of C or better.
OR
Completion of MATH 1B, as UG, with a grade of C or better.
OR
Completion of MATH 1C, as UG, with a grade of C or better.
OR
Score of 2600 on Accuplacer Math)

COREQUISITES:

CREDIT STATUS: D - Credit - Degree Applicable

GRADING MODES
   L - Standard Letter Grade

REPEATABILITY: N - Course may not be repeated

SCHEDULE TYPES:
   02 - Lecture and/or discussion
   03 - Lecture/Laboratory
   04 - Laboratory/Studio/Activity

STUDENT LEARNING OUTCOMES:
1. Demonstrate proficiency in using scientific notation, significant figures, and measurement units.
2. Design strategies to approach and solve problems using dimensional analysis.
3. Use the periodic table to gain information about atoms, elements and predict their properties and reactivities.
   Measure: Homework, Quiz and Exam
   PLO:
   ILO: 2, 1, 7
   GE-LO: B1, B3, B5, B6, A6
   Year assessed or anticipated year of assessment: Fall 2008

4. Differentiate among the three basic classifications of matter: elements, compounds and mixtures as well as their formation and physical properties.
5. Demonstrate and analyze the concepts of moles and molarity.
6. Identify the major class of reactions, balance equations and predict their products
7. Determine and write the chemical names and formulas of ionic and molecular compounds.
8. Develop strategies to approach, comprehend and solve problems involving stoichiometry.
9. Evaluate the chemical properties of electrolytes, acids and bases.

10. Demonstrate and analyze the formation, products and properties of solutions.
12. Writing and balancing equations for oxidation-reduction reactions for both acidic and basic solutions.

13. Distinguish between exothermic/endo-thermic reactions and evaluate chemical systems and thermal properties.
14. To prepare, manipulate and interpret thermochemical equations, enthalpy diagrams and use Hess's Law to calculate enthalpy changes.

15. Distinguish the main features of atomic theory and apply the fundamental organization of the atom including the electron orbitals.
16. Relate the electron configuration of elements to their location in the periodic table and the element's corresponding properties.
17. Determine how ionic and molecular compounds are formed from their elements and what factors cause elements to form an ionic or molecular compound.

18. Draw Lewis diagrams for the structures of molecules and polyatomic ions and determine the polarity of bonds based upon the difference in electronegativity.
19. Compare and contrast the Valence Bond and VSEPR theories and predict the geometries of molecules.
20. Compare and contrast Hybrid Orbital and Molecular Orbital theories to explain multiple bonds and the shapes of molecules.

Measure: Homework, Quiz and Exam
PLO:
ILO: 2, 1, 7
GE-LO: B1, B3, B5, B6, A6
Year assessed or anticipated year of assessment: Fall 2008

21. Use the Ideal Gas Laws to quantitatively describe gaseous behavior.

22. Explain the Kinetic-Molecular theory of gases and relate it to the properties of gases.

Measure: Homework, Quiz and Exam
PLO:
ILO: 2, 1, 7
GE-LO: B1, B3, B5, B6, A6
Year assessed or anticipated year of assessment: Fall 2016

23. Describe the differences between the intermolecular forces and predict which forces will affect a given sample and determine its properties.

24. Apply Le Chatelier's principle of dynamic equilibrium to chemical reactions.

25. Explain how atoms, ions or molecules can be arranged in crystalline solids and predict their properties.

Measure: Homework, Quiz and Exam
PLO:
ILO: 2, 1, 7
GE-LO: B1, B3, B5, B6, A6
Year assessed or anticipated year of assessment: Fall 2016

26. Collect and analyze laboratory experimental data and solve related chemical problems.

27. Examine chemical concepts through peer interaction and written laboratory reports.

28. Relate classroom and laboratory experiences to phenomena outside the classroom.

Measure: Homework, Quiz, Exam and Laboratory Reports
PLO:
ILO: 2, 1, 4, 6
GE-LO: B4, B7, B8, A5
Year assessed or anticipated year of assessment: Fall 2008

PROGRAM LEARNING OUTCOMES:

Employing the scientific method as a basis for evaluation theoretical and laboratory derived information, students will gain an understanding of the biological and/or physical worlds. Students will also gain a working familiarity with mathematics and an understanding of mathematics as it applies to modeling in the sciences.

CONTENT, STUDENT PERFORMANCE OBJECTIVES, OUT-OF-CLASS ASSIGNMENTS

Curriculum Approval Date: 11/23/2015

10 Hours

Chapter-1 Fundamentals of Chemical Change
The scientific method. Matter, energy and chemical changes. Measured quantities and their units. Computations, dimensional analysis and significant figures. Properties of substances; density and specific gravity.
Homework problems from text and instructor.
Laboratory Experiment: Locker Check-In and Safety.
Demonstrate proficiency in using scientific notation, significant figures, and measurement units.
Design strategies to approach and solve problems using dimensional analysis.

18 Hours

Chapter-2 The Periodic Table and Some Properties of the Elements

Homework problems from text and instructor.
Laboratory Experiment: Techniques and Measurements.
Use the periodic table to gain information about atoms, elements and predict their properties and reactivities.
Differentiate among the three basic classifications of matter: elements, compounds and mixtures as well as their formation and physical properties.
Determine and write the chemical names and formulas of ionic and molecular compounds.

18 Hours

Chapter-3 Stoichiometry: Quantitative Chemical Relationships

Homework problems from text and instructor.
Laboratory Experiment: Empirical Formula of an Oxide.
Identify the major classes of chemical reactions, balance equations and predict their products.
Demonstrate and analyze the concepts of moles and molarity.
Develop strategies to approach, comprehend and solve chemical problems involving stoichiometry.

10 Hours

Chapter-4 Reactions Between Ions in Aqueous Solutions

Homework problems from text and instructor.
Laboratory Experiment: Limiting Reagents.
Evaluate the chemical properties of electrolytes, acids and bases.
Demonstrate and analyze the formation, products and properties of solutions.

18 Hours

Chapter-5 Oxidation-Reduction Reactions

Homework problems from text and instructor.
Laboratory Experiment: Reaction Types.
Recognize oxidation-reduction reactions and assignment of oxidation numbers.
Writing and balancing equations for oxidation-reduction reactions for both acidic and basic solutions.

18 Hours

Chapter-6 Energy and Thermochemistry

Homework Problems from text and instructor.

Laboratory Experiment: Cation Identification.

Distinguish between exothermic/endothermic reactions and evaluate chemical systems and thermal properties.

To prepare, manipulate and interpret thermochemical equations, enthalpy diagrams and use Hess’s Law to calculate enthalpy changes.

10 Hours

Chapter-7 Atomic and Electronic Structure


Homework Problems from text and instructor.

Laboratory Experiment: Calorimetry.

Distinguish the main features of atomic theory and apply the fundamental organization of the atom including the electron orbitals.

Relate the electron configuration of elements to their location in the periodic table and the corresponding properties of many elements.

18 Hours

Chapter-8 Chemical Bonding: General Concepts


Homework Problems from text and instructor.

Laboratory Experiment: Spectrophotometric Iron Analysis.

Determine how ionic and molecular compounds are formed from their elements and what factors cause elements to form ionic and molecular compounds.

Draw Lewis diagrams for the structures of molecules and polyatomic ions and determine the polarity of bonds based upon the differences in electronegativity.

18 Hours

Chapter-9 Chemical Bonding and Molecular Structure


Homework Problems from text and instructor.

Laboratory Experiment: Chemical Periodicity.

Compare and contrast the Valence Bond and VSEPR theories.

Compare and contrast Hybrid Orbitals and Molecular Orbital theories to explain multiple bonds and the shapes of molecules.

10 Hours

Chapter-10 Properties of Gases


Homework Problems from text and instructor.
Laboratory Experiment: Hard Water Analysis.
Use the gas laws to quantitatively describe gaseous behavior.
Explain the Kinetic-Molecular Theory of Gases and relate it to the properties of gases.
Chapter-11 Intermolecular Attractions and the Properties of Liquids and Solids
Homework Problems from text and instructor.
Laboratory Experiment: Molar Mass of a Volatile Liquid.
Describe the differences between the intermolecular forces and predict which forces will affect a given sample and determine its properties.
Apply Le Chatelier's principle of dynamic equilibrium.
Explain how atoms, ions or molecules can be arranged in crystalline solids and predict their properties.
Final Examination (cumulative)
Comprehensive over the entire course with evaluation of each of the areas previously examined.

METHODS OF INSTRUCTION:
Instruction is by lecture, class discussion, lecture demonstration, small group problem solving, laboratory work projects and homework.

METHODS OF EVALUATION:
CATEGORY 1 - The types of writing assignments required:
Percent range of total grade: 20 % to 30 %
Written Homework
Lab Reports
Other: Extra credit report on a Chemistry topic.
CATEGORY 2 - The problem-solving assignments required:
Percent range of total grade: 70 % to 80 %
Homework Problems
Lab Reports
Quizzes
Exams
CATEGORY 3 - The types of skill demonstrations required:
Percent range of total grade: 0 % to %
CATEGORY 4 - The types of objective examinations used in the course:
Percent range of total grade: 0 % to %
CATEGORY 5 - Any other methods of evaluation:
Percent range of total grade: 0 % to %
REPRESENTATIVE TEXTBOOKS:

Required:

Recommended:

Or other appropriate college level text.

Reading level of text, Grade: 13.0
Verified by: D. Clark
Other textbooks or materials to be purchased by the student: None

ARTICULATION and CERTIFICATE INFORMATION

Associate Degree:
GAV B1, effective 201070
GAV B3, effective 201070

CSU GE:
CSU B1, effective 201070
CSU B3, effective 201070

IGETC:
IGETC 5A, effective 201070
IGETC 5C, effective 201070

CSU TRANSFER:
Transferable CSU, effective 201070

UC TRANSFER:
Transferable UC, effective 201070

SUPPLEMENTAL DATA:

Basic Skills: N
Classification: Y
Noncredit Category: Y
Cooperative Education:
Program Status: 1 Program Applicable
Special Class Status: N
CAN: CHEM2
CAN Sequence: CHEM SEQ A
CSU Crosswalk Course Department: CHEM
CSU Crosswalk Course Number: 1A
Prior to College Level: Y
Non Credit Enhanced Funding: N
Funding Agency Code: Y
In-Service: N

11/25/2015
Occupational Course: E
Maximum Hours:
Minimum Hours:
Course Control Number: CCC000071527
Sports/Physical Education Course: N
Taxonomy of Program: 190500