Course Outline

COURSE: CHEM 1B  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

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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>Lecture</td>
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<td></td>
<td></td>
<td>Lab</td>
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COURSE DESCRIPTION:

This is the second semester of a year-long general chemistry course designed as a continuation of Chemistry 1A. Topics include solutions, thermodynamics, chemical kinetics, the equilibria of acids and bases, solubility systems, complex ions, electrochemistry, the chemistry of metals and nonmetals, as well as nuclear chemistry. (C-ID: CHEM 120S: Chem 1A + Chem 1B) PREREQUISITE: Chemistry 1A with a grade of C or better.

PREREQUISITES:
    Completion of CHEM 1A, as UG, with a grade of C or better.

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. Describe the effects of temperature and pressure on the solubility of solutions.

11/25/2015
2. Compare and contrast the colligative properties of solutions including osmotic pressure.

Measure: Homework, Quiz and Exam

PLO:

ILO: 2, 1, 7

GE-LO: B1, B3, B5, B6, A6

Year assessed or anticipated year of assessment: Spring 2011

3. Explain the First, Second and Third Laws of Thermodynamics and solve problems based on the laws of thermodynamics.

4. Determine the spontaneity of a reaction and relate the free energy of a reaction to its equilibrium constant.

Measure: Homework, Quiz and Exam

PLO:

ILO: 2, 1, 7

GE-LO: B1, B3, B5, B6, A6

Year assessed or anticipated year of assessment: Spring 2011

5. Determine the rate law for a reaction based on the reaction mechanism and explain the dependence of reaction rate on concentration and temperature.

6. Compare and contrast the Collision and Transition-State Theories and solve problems based on the Arrhenius equation.

Measure: Homework, Quiz and Exam

PLO:

ILO: 2, 1, 7

GE-LO: B1, B3, B5, B6, A6

Year assessed or anticipated year of assessment: Spring 2016

7. Determine the extent of a molecular reaction through the study of chemical equilibria.

8. Apply Le Chatelier's Principle to chemical equilibria and solve problems based on equilibria data.

Measure: Homework, Quiz and Exam

PLO:

ILO: 2, 1, 7

GE-LO: B1, B3, B5, B6, A6

Year assessed or anticipated year of assessment: Spring 2011


10. Describe the self-ionization of water and compute the pH of a solution of a strong acid or strong base.

11. Solve problems based on the ionization of a weak acid or weak base, as well as salt solutions.

Measure: Homework, Quiz and Exam

PLO:

ILO: 2, 1, 7

GE-LO: B1, B3, B5, B6, A6

Year assessed or anticipated year of assessment: Spring 2011

12. Describe the preparation of a buffer and perform buffer solution calculations.

13. Determine the solubility product expressions for sparingly soluble ionic solids.

14. Perform calculations based on solubility product expressions.

Measure: Homework, Quiz and Exam

PLO:
15. Compare and contrast electrolytic cells with voltaic cells and use standard reduction potentials to calculate a specific cell's potential.
16. Solve stoichiometric calculations based on electrolysis.
Measure: Homework, Quiz and Exam
PLO:
ILO: 2, 1, 7
GE-LO: B1, B3, B5, B6, A6
Year assessed or anticipated year of assessment: Spring 2011

17. Describe the formation and structure of complex-ions and coordination compounds as well as determining the nomenclature of complex-ions and coordination compounds.
18. Describe the Valence Bond Theory and the Crystal Field Theory of complexes.
Measure: Homework, Quiz and Exam
PLO:
ILO: 2, 1, 7
GE-LO: B1, B3, B5, B6, A6
Year assessed or anticipated year of assessment: Spring 2016

19. Define radioactivity and describe the different types of radiation.
20. Balance nuclear reaction equations and solve problems based on the rate of the radioactive decay of an isotope.
Measure: Homework, Quiz and Exam
PLO:
ILO: 2, 1, 7
GE-LO: B1, B3, B5, B6, A6
Year assessed or anticipated year of assessment: Spring 2016

21. Collect and analyze laboratory experimental data and solve related chemical problems.
22. Examine chemical concepts through peer interaction and written laboratory reports.
23. 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: Spring 2016

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
18 Hours
Chapter-12  Solutions
Homework problems from text and instructor.
Laboratory Experiment: Locker Check-In and Safety.
Describe the effects of temperature and pressure on the solubility of solutions.
Compare and contrast the colligative properties of solutions including osmotic pressure.

18 Hours
Chapter-18  Thermodynamics
Homework problems from text and instructor.
Laboratory Experiment: Isolation of Caffeine from Tea.
Explain the First, Second and Third Laws of Thermodynamics and solve problems based on the laws of thermodynamics
Determine the spontaneity of a reaction and relate the free energy of a reaction to its equilibrium constant.

10 Hours
Chapter-13  Kinetics: The Study of Rates of Reactions.
Homework problems from text and instructor.
Laboratory Experiment: Molar Mass Determination / Freezing Point Depression.
Determine the rate law for a reaction based on the reaction mechanism and explain the dependence of reaction rate on concentration and temperature.
Compare and contrast the Collision and Transition-State Theories and solve problems based on the Arrhenius equation.

18 Hours
Chapter-14  Chemical Equilibrium-General Concepts
Homework problems from text and instructor.
Laboratory Experiment: Rate Law Determination / Kinetics.
Determine the extent of a molecular reaction through the study of chemical equilibria.
Apply Le Chateliers Principle to chemical equilibria and solve problems based on equilibria data.

18 Hours
Chapter-15  Acids and Bases: A Second Look

Homework problems from text and instructor.
Laboratory Experiment: Le Chatelier's Principle / Chemical Equilibrium.
Compare and contrast Arrhenius, Bronsted-Lowry and Lewis theories of acids and bases.
Describe the self-ionization of water and compute the pH of a solution of a strong acid or strong base.

18 Hours
Chapter-16 Equilibria in Solutions of Weak Acids and Bases
Homework problems from text and instructor.
Laboratory Experiment: Acid - Base Titrations.
Solve problems based on the ionization of a weak acid or weak base, as well as salt solutions.
Describe the preparation of a buffer and perform buffer solution calculations.

10 Hours
Chapter-17 Solubility and Simultaneous Equilibria
Solubility equilibria for salts, metal oxides and sulfides. Separating metal ions by selective precipitation. Complex-ions and their equilibria in aqueous solutions.
Homework problems from text and instructor.
Laboratory Experiment: Solubility Constant and Common-Ion Effect.
Determine the solubility product expressions for sparingly soluble ionic solids.
Perform calculations based on solubility product expressions.

18 Hours
Chapter-19 Electrochemistry
Homework problems from text and instructor.
Laboratory Experiment: The Electrolytic Cell / Electrochemistry.
Compare and contrast electrolytic cells with voltaic cells and use standard reduction potentials to calculate a specific cell's potential.
Solve stoichiometric calculations based on electrolysis.

10 Hours
Chapter-20 Properties of Metals and Metal Complexes
Homework problems from text and instructor.
Laboratory Experiment: Coordination Compounds / Metal Complexes.

11/25/2015
Describe the formation and structure of complex-ions and coordination compounds as well as determining the nomenclature of complex-ions and coordination compounds.

Describe the Valence Bond Theory and the Crystal Field Theory of complexes.

10 Hours
Chapter-22 Nuclear Reactions and Their Role in Chemistry
Homework problems from text and instructor.
Laboratory Experiment: Locker Check-Out.
Define radioactivity and describe the different types of radiation.
Balance nuclear reaction equations and solve problems based on the rate of the radioactive decay of an isotope.

2 Hours
Final Examination (cumulative).
Comprehensive over the entire course with evaluation of each of the areas previously encountered.

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: CHEM4
CAN Sequence: CHEM SEQ A
CSU Crosswalk Course Department: CHEM
CSU Crosswalk Course Number: 1B
Prior to College Level: Y
Non Credit Enhanced Funding: N

11/25/2015
Funding Agency Code: Y
In-Service: N
Occupational Course: E
Maximum Hours: 
Minimum Hours: 
Course Control Number: CCC000322648
Sports/Physical Education Course: N
Taxonomy of Program: 190500