Las Positas College
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Course Outline for CHEM 1B

GENERAL COLLEGE CHEMISTRY II

Effective: Fall 2010

I. CATALOG DESCRIPTION:
CHEM 1B — GENERAL COLLEGE CHEMISTRY II — 5.00 units

Continuation of Chemistry 1A. Includes chemical energetics and equilibria, solutions and ionic equilibria, acid-base chemistry, electrochemistry, coordination chemistry, kinetics, nuclear chemistry, organic chemistry, and the chemistry of family groups of the periodic table. Laboratory emphasizes quantitative techniques, including instrumentation, and qualitative analysis.

3.00 Units Lecture 2.00 Units Lab

Prerequisite
CHEM 1A - General College Chemistry I
with a minimum grade of C

Grading Methods:
Letter Grade

Discipline:

	MIN
Lecture Hours:	54.00
Lab Hours:	108.00
Total Hours:	162.00

II. NUMBER OF TIMES COURSE MAY BE TAKEN FOR CREDIT: 1

III. PREREQUISITE AND/OR ADVISORY SKILLS:
Before entering the course a student should be able to:

A. CHEM1A

IV. MEASURABLE OBJECTIVES:
Upon completion of this course, the student should be able to:

A. Solve problems involving gas-phase, acid-base, solubility, and complex ion equilibria;
B. Calculate free energy of a reaction from standard free energies of formation and from enthalpies and entropies of reaction;
C. Predict the conditions under which a reaction will be spontaneous or nonspontaneous;
D. Determine the extent of acid-base, precipitation and complex equilibria;
E. Interpret reactions in terms of Arrhenius, Bronsted-Lowry and Lewis acid-base theory;
F. Use acid dissociation constants to predict acid-base strength;
G. Predict whether oxidation-reduction reactions will occur and set up voltaic and electrolytic cells;
H. Describe factors that affect the rate of chemical reactions;
I. Write rate constant and related kinetic expressions based on reaction data;
J. Interpret and evaluate reaction mechanisms;
K. Describe current models for the bonding of coordination compounds;
L. Name complex ions;
M. Describe changes that occur in the nuclei of atoms;
N. Name and describe the major functional groups in organic chemistry;
O. Recognize properties of family groups of the periodic table in terms of chemical principles;
P. Perform titrimetric experiments;
Q. Measure pH with the use of pH meters or indicators;
R. Perform quantitative laboratory experiments in an accurate and precise manner;
S. Perform qualitative analysis of anions and cations in the laboratory;
T. Collect and analyze scientific data, using statistical and graphical methods;
U. Acquire and analyze data with a computer and appropriate software and design spreadsheets for data acquisition and analysis;
V. Perform laboratory experiments in an efficient, safe, and purposeful manner.

V. CONTENT:
A. Laboratory Safety
B. Solutions
C. Thermodynamics

D. Principles of equilibrium
E. Acid-base theory
F. Acid-base, precipitation, and complex equilibria
G. Electrochemistry
H. Coordination chemistry
I. Kinetics
J. Nuclear chemistry
K. Organic chemistry
L. Descriptive chemistry of the elements
M. Qualitative analysis of anions and cations
N. Titrations, including a potentiometic titration
O. Spectrophotometric analysis
P. Construction and analysis of batteries and electrolytic cells

VI. METHODS OF INSTRUCTION:

A. Lecture, informal with student questions encouraged
B. Models, periodic tables, videos, overhead transparencies
C. Computer simulations
D. **Field Trips** - (at the option of the instructor)
E. Laboratory experimentation, including computer acquisition of data
F. Oral presentations on chemical topics (at the option of the instructor)
G. Safety and proper respect for chemicals and scientific apparatus are constantly stressed.
H. **Demonstration** -

VII. TYPICAL ASSIGNMENTS:

A. Read the chapter on Chemical Kinetics
    1. Work all of the in-chapter problems
    2. Work 10 problems selected from the end of the chapter problems for which solutions are not provided in the text.
B. Complete worksheets on Predicting Chemical Reactions
C. After completing the experiment on Electrochemical Cells and Electrolysis, Corrosion and Passivation, use spreadsheet software to plot current vs. time and to integrate current-time to get total charge. Use this and other experimental information to calculate the thickness of the film on the anodized area.

VIII. EVALUATION:

A. **Methods**

1. Exams/Tests
2. Quizzes
3. Papers
4. Home Work
5. Lab Activities
6. Other:
    a. Methods of evaluation
        1. Homework will be assigned, collected, and grade
        2. Quizzes may be used at the option of the instructor
        3. Written lab reports graded on criteria that may include the following
            a. Description of experimental procedures
            b. Completeness of data collected
            c. Quality of data collected
            d. Computational precision and accuracy
            e. Accuracy and precision of experimental laboratory results
            f. Proper use of symbolic notation
            g. Quality of analysis of scientific principles explored
            h. Quality of narrative explanations and reasoning
            i. Representation of data in tables or diagrams
        4. Midterm examinations or tests
        5. Final examination

B. **Frequency**

1. Homework: 10 to 20 assignments; 1 or 2 per chapter
2. Quizzes : options include daily, weekly, or biweekly
3. Written lab reports: 1 to 2 per week
4. Midterm examinations: 1 – 5 tests

IX. TYPICAL TEXTS:

1. Zumdahl, Steven S. and Susan A. Zumdahl *Chemical.* 8th ed., Houghton Mifflin Company, 2010.
2. Tro, Nivaldo J *Chemistry A Molecular Approach.* 2nd ed., Prentice Hall, 2011.
3. Silberberg, Martin S *Chemistry: The Molecular Nature of Matter and Change.* 5th ed., McGraw-Hill, 2009.

X. OTHER MATERIALS REQUIRED OF STUDENTS:

A. Safety goggles approved for chemistry laboratory
B. Scientific calculator
C. Student laboratory notebook