

CHEM 1B Course Outline as of Fall 2020**CATALOG INFORMATION**

Dept and Nbr: CHEM 1B Title: GENERAL CHEMISTRY
 Full Title: General Chemistry
 Last Reviewed: 5/13/2019

Units	Course Hours per Week		Nbr of Weeks		Course Hours Total	
Maximum	5.00	Lecture Scheduled	3.00	17.5	Lecture Scheduled	52.50
Minimum	5.00	Lab Scheduled	6.00	8	Lab Scheduled	105.00
		Contact DHR	0		Contact DHR	0
		Contact Total	9.00		Contact Total	157.50
		Non-contact DHR	0		Non-contact DHR	0

Total Out of Class Hours: 105.00

Total Student Learning Hours: 262.50

Title 5 Category: AA Degree Applicable

Grading: Grade Only

Repeatability: 00 - Two Repeats if Grade was D, F, NC, or NP

Also Listed As:

Formerly:

Catalog Description:

A continuation of Chemistry 1A. Topics include chemical kinetics, thermodynamics, chemical equilibrium, acids and bases, nuclear chemistry, electrochemistry, coordination compounds and bonding, and selected topics in descriptive chemistry. Laboratory emphasizes methods of analytical chemistry and quantitative work.

Prerequisites/Corequisites:

Chemistry 1A or equivalent with a grade of "C" or better

Recommended Preparation:**Limits on Enrollment:****Schedule of Classes Information:**

Description: A continuation of Chemistry 1A. Topics include chemical kinetics, thermodynamics, chemical equilibrium, acids and bases, nuclear chemistry, electrochemistry, coordination compounds and bonding, and selected topics in descriptive chemistry. Laboratory emphasizes methods of analytical chemistry and quantitative work. (Grade Only)

Prerequisites/Corequisites: Chemistry 1A or equivalent with a grade of "C" or better

- analysis.
9. Use advanced instrumentation, such as ultraviolet-visible and infrared (IR) spectroscopy, gas chromatography (GC) and atomic absorption (AA) in analysis of unknowns.
 10. Analyze experimental error qualitatively and with statistical methods.
 11. Apply chemical principles to real world situations.

Topics and Scope:

I. Colligative Properties

- A. Vapor pressure lowering
- B. Freezing point depression
- C. Boiling point elevation
- D. Osmosis

II. Kinetics

- A. Reaction rates and rate laws
- B. Determining rate laws
- C. Integrated rate laws
- D. Activation energy and the Arrhenius equation
- E. Reaction mechanisms
- F. Catalysis

III. Chemical Equilibrium

- A. Equilibrium constants (K) and quotients (Q)
- B. Le Chatelier's principle
- C. Dependence on temperature
- D. Methods and approximations for solving equilibrium systems

IV. Aqueous Equilibria

- A. Weak acids and bases
- B. pH, pKa, buffers and titration
- C. Polyprotic acids
- D. Solubility equilibria
- E. Common ion effect
- F. Complex ion equilibria

V. Entropy and Free Energy

- A. Second Law of Thermodynamics
- B. Change in Entropy
- C. Free Energy and Work
- D. Free Energy, Equilibrium and Direction of Reaction

VI. Electrochemistry

- A. Balancing oxidation-reduction reactions
- B. Voltaic cells
- C. Standard reduction potentials
- D. Concentration cells and the Nernst equation
- E. Batteries
- F. Electrolysis

VII. Coordination Chemistry of Transition Metals

- A. Coordination compounds
- B. Types of isomerism
- C. Ligand Field Theory

VIII. Nuclear Chemistry

- A. Types of radioactive decay
- B. Kinetics of decay
- C. Applications

- D. Fission and fusion
- IX. Introduction to Organic Chemistry
 - A. Basic structures and nomenclature
 - B. Isomerism
 - C. Functional groups

Laboratory material:

1. Lab safety and maintaining a lab notebook
2. Colligative properties
3. Determining rate law and activation energy
4. Determining an equilibrium constant
5. Buffers
6. Indicators
7. Potentiometric titration
8. Solubility products
9. Determination of an unknown
10. Voltaic Cells
11. Electrolytic Cells
12. Synthesis and analysis of a metal complex
13. Nuclear chemistry
14. Techniques and skills
 - a. Use of spreadsheet software
 - b. Instrumental analysis
 - c. Use of calibration curves
 - d. Writing laboratory reports

All sections are covered in the lecture and lab portions of the course.

Assignment:

Lecture-Related Assignments:

1. Specific reading and study assignments from the lecture textbook (10-30 pages per week)
2. Completion of recommended end-of-chapter problems (15-20 per week)
3. Midterm exams (2-5), Quizzes (0-4), Final exam

Lecture-Related Assignments:

1. Laboratory experiments and accompanying reports (13-18)

Methods of Evaluation/Basis of Grade:

Writing: Assessment tools that demonstrate writing skills and/or require students to select, organize and explain ideas in writing.

Lab reports

Writing 5 - 15%

Problem Solving: Assessment tools, other than exams, that demonstrate competence in computational or non-computational problem solving skills.

Lab reports, end-of-chapter homework assignments	Problem solving 15 - 25%
Skill Demonstrations: All skill-based and physical demonstrations used for assessment purposes including skill performance exams.	
Lab skill technique and accuracy and precision of lab results	Skill Demonstrations 0 - 10%
Exams: All forms of formal testing, other than skill performance exams.	
Exams, quizzes and tests	Exams 50 - 80%
Other: Includes any assessment tools that do not logically fit into the above categories.	
None	Other Category 0 - 0%

Representative Textbooks and Materials:

Chemistry: The Molecular Nature of Matter and Change. 8th ed. Silberberg, Martin and Amateis, Patricia. McGraw-Hill. 2017

Chemistry: The Science in Context. 5th ed. Gilbert, Thomas and Kirss, Rein and Foster, Natalie. Norton. 2017

Chemistry: A Molecular Approach. 4th ed. Tro, Nivaldo. Pearson. 2016

Chemistry. 12th ed. Chang, Raymond and Goldsby, Kenneth. McGraw-Hill. 2015

General Chemistry. 4th ed. McQuarrie, Donald and Rock, Peter and Gallogly, Ethan. University Science Books. 2010 (classic)

Lab Manuals

Instructor Prepared Materials

Laboratory Experiments for Chemistry: The Central Science. 14th ed. Brown, Theodore and LeMay, Eugene and Bursten, Bruce. Pearson. 2017

Laboratory Manual for Chemistry: A Molecular Approach. 4th ed. Tro, Nivaldo and Vincent, John and Livingston, Erica. Pearson. 2016