COURSE Syllabus

Chemistry 4B General Chemistry & Quantitative Analysis
Spring 2021

This series is intended for majors in physical and biological sciences and in engineering. It presents the foundation principles of chemistry, including stoichiometry, ideal and real gases, acid-base and solubility equilibria, oxidation-reduction reactions, thermochemistry, entropy, nuclear chemistry and radioactivity, the atoms and elements, the periodic table, quantum theory, chemical bonding, molecular structure, chemical kinetics, and descriptive chemistry. Examples and applications will be drawn from diverse areas of special interest such as atmospheric, environmental, materials, polymer and computational chemistry, and biochemistry. *Laboratory emphasizes quantitative work*. Equivalent to 1A-1B plus 15 as prerequisite for further courses in chemistry.

Lectures: Mondays, Wednesdays, and Fridays 10:10-11:00 AM
Online

Web Page: https://bcourses.berkeley.edu/courses/1501276

Instructors:

Professor Richard J. Saykally
D31 Hildebrand Hall
Office Hours: Wednesdays 1:30**:** Zoom link
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Research Group: www.cchem.berkeley.edu/rjsgrp/

Professor John Arnold
526 Latimer Hall
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Prerequisites: C- or better in Chemistry 4A; B- or better in Chemistry 1A

Texts(2): Oxtoby, Gilles and Campion, *Principles of Modern Chemistry (8th Edition)*, Saunders College Publishing; ***Required***
Daniel C. Harris, *Quantitative Chemical Analysis (9th Edition),* W.H. Freeman and Company; ***Required***

Lab Manual: On bCourses

Course Content: To the maximum extent possible, this course will be a survey of modern topics in chemistry. It will include basic principles as well as contemporary applications. The lecture material is divided into four sections. Each section is followed by an exam. An outline of the lectures for each section will be provided separately. Laboratory material is coordinated with the lectures to the maximum extent possible, although they are ultimately independent and complementary parts of the course. *Lecture material is designed to complement, not to repeat, the recommended reading in the text. Hence, your reading should be completed before the lectures*.

PART I: **I: When Things Go Boom: Rates of Chemical Reactions** (10 Lectures)
CONCEPTS: Chemical kinetics, theory of chemical reactions, catalysis
EXAM: (F 2/12) Exam 1 – IN CLASS

PART II: **II: Clean Energy?** (8 Lectures)
CONCEPTS: Electrochemistry, nuclear chemistry, batteries, fuel cells
EXAM: (M 3/8) Exam 2 – IN CLASS

PART III: **III: Survey of the Periodic Table** (10 Lectures)
CONCEPTS: Chemistry of the *s*, *p* and *d* block elements. Organic molecules, transition metal coordination chemistry.
EXAM: (Wed 4/7) Exam 3 – IN CLASS

Part IV: **IV: Inorganic & Organic Materials** (9 Lectures)
CONCEPTS: Chemistry of the *f* block elements. Inorganic materials; synthetic and natural polymers

FINAL EXAM: Scheduled for 5/12/21 from 8-11 AM PST
The final exam is cumulative and must be taken to pass the course.

Grading: The composition of your course grade will be:

Midterms (3)	30%
Final Exam (Cumulative)	30%
Laboratory	35%
Problem Sets	5%

Letter grades will be assigned as follows

A: 90–100%
B: 75–90%
C: 55–75%
D: 35–55%
F: 00–35%

Cutoffs may be lowered but they will not be raised!

Homework: Homework will be assigned and graded. Assignments will be available to download from bCourses and will be submitted via bCourses. No late homework will be accepted.

Exams: No makeup exams will be given. If you miss an exam, you will receive a grade of zero, except in cases of *documented* emergencies.

*Discussion***:** GSIs will be hosting optional weekly discussion/review sessions. Exam review session dates and times will also be given. Details available later.