COURSE OUTLINE

Chemistry 4A: General Chemistry & Quantitative Analysis
Fall Semester 2019

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 12-1 PM
1 Pimentel Hall

Web Page: https://bcourses.berkeley.edu/courses/1482957

Instructors: Professor Richard J. Saykally
D31 Hildebrand Hall
642-8269
Office Hours: Wednesdays 1:30
E-Mail: saykally@berkeley.edu
Research Group: www.cchem.berkeley.edu/rjsgrp/

Professor Ke Xu
478 Stanley Hall
666-2784
Office Hours: Wednesdays 1:30
E-Mail: xuk@berkeley.edu
Research Group: www.cchem.berkeley.edu/xuklab/

Prerequisites: High School Chemistry, Calculus (concurrent)
Understanding of Material in Oxtoby Chapters 1, 2, and Appendices A, B, C Assumed

Texts(2): Oxtoby, Gilles and Campion, Principles of Modern Chemistry (8th Edition), Cengage; **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: Introduction to Chemical Reactions** (7 Lectures)
EXAM: Monday, September 16 – IN CLASS

PART II: **II: Spectroscopy and the Structure of Matter** (11 Lectures)
EXAM: Monday, October 14 – IN CLASS

PART III: **III: Ideal Gases and Laws of Thermodynamics** (10 Lectures)
EXAM: Friday, November 8 – IN CLASS

Part IV: **IV: Thermodynamics in Chemistry: Equilibria, Acids and Bases, and Phases** (9 Lectures)
EXAM: Final Exam: Monday, 12/16/19, 3–6 pm

Grading: The approximate 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 (cutoffs may be lowered but they will not be raised!):

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

Homework: Homework will be assigned and graded. Assignments are to be handed in to your GSI **before** lecture on the date due. 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**:** The GSIs will be hosting weekly discussion sessions on Tuesdays from 5:00 - 7:00PM in 100 Lewis Hall.