GENERAL CHEMISTRY I/II
Columbia University
Chemistry 1403D/1404Q
Dr. Beer

COURSE OVERVIEW: This course is an intensive two-semester sequence in general chemistry taught over the summer in two summer sessions. It is equivalent to General Chemistry I/II (1403/1404) taught during the regular academic year.

The first term of the course is comprised largely of (1) a brief review of introductory chemistry concepts, followed by (2) atomic and molecular structure and bonding in depth and (3) a comprehensive survey of organic and inorganic chemistry. If time allows, spectroscopy is an additional topic of study.

The second term of the sequence focuses largely on (1) gases, liquids, solids and solutions (2) chemical equilibria including acid/base chemistry (3) thermodynamics (energy flow) (4) electrochemistry and kinetics.

You should have a solid understanding of high school chemistry and good basic mathematics skills to be successful in the course. There is no chemistry laboratory co-requisite.

INSTRUCTOR: Dr. Robert H. Beer, Lecturer
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REQUIRED TEXT: The text for the course is Chemical Principles (7th Edition) by Steven S. Zumdahl, Houghton Mifflin Co. Ancillary materials, such as a Student Solutions Manual with detailed answers to the homework problems are available.

LECTURE AND RECITATION: The lecture course meets Monday-Thursday mornings and presents primarily the conceptual aspects of the course. Enrollment in the recitation (discussion) section, 1403/4-R01, is required; it is scheduled Monday-Thursday mornings before the lecture from 9:30-10:20am. The recitation is led by a teaching assistant to go over problem-solving strategies and homework. Attendance at all lectures and recitations is highly recommended.

GRADING: There are regularly scheduled quizzes in recitation (100 pts), three exams (100 pts) and a comprehensive final (200 pts) – 100 pts (the lowest exam equivalent) is dropped, but there are no make-up exams. The course grades are curved. Exams (approx. every 2 weeks) will be given during the lecture period at regularly scheduled intervals Quizzes (20 min.) will be given regularly (approx. every other recitation) in the recitation sections. Suggested homework assignments will be recommended, but not collected and graded. A comprehensive final will be given during the last scheduled lecture period.

Full details for the course, including a detailed syllabus and course calendar, will be provided once or near the start of classes on Courseworks. You can obtain access to the Courseworks site (https://courseworks.columbia.edu) after registering for the course.

If you have any questions please feel free to the email the course Lecturer.
TENTATIVE ORDER OF TOPICS:

S1403D - Session I (MTWR)

REVIEW OF BASIC CHEMICAL CONCEPTS
Chapter 2  Atoms, Molecules and Ions
Chapter 18  The Representative Elements – selected portions
Chapter 3  Stoichiometry
Chapter 13  Bonding: General Concepts

ATOMIC AND MOLECULAR STRUCTURE
Chapter 12  Quantum Mechanics and Atomic Theory
Chapter 14  Covalent Bonding: Orbitals

ORGANIC CHEMISTRY
Chapter 21  Organic and Biochemical Molecules

TRANSITION METAL CHEMISTRY
Chapter 19  Transition Metals and Coordination Chemistry

SOLIDS
Chapter 16 – Liquids and Solids (selected portions)

SPECTROSCOPY
Chapter 14 – Covalent Bonding (selected portions)

S1404Q - Session II S - (MTWR)

MOLECULAR DESCRIPTION OF THE STATES OF MATTER
Chapter 5  Gases
Chapter 16  Liquids and Solids
Chapter 17  Properties of Solutions

EQUILIBRIUM IN CHEMICAL REACTIONS
Chapter 6  Chemical Equilibrium
Chapter 7  Acids and Bases
Chapter 8  Applications of Aqueous Equilibria

ENERGY IN CHEMICAL REACTIONS
Chapter 9  Energy, Enthalpy and Thermochemistry
Chapter 10  Spontaneity, Entropy and Free Energy
Chapter 11  Electrochemistry

RATES OF CHEMICAL AND PHYSICAL PROCESSES
Chapter 15  Chemical Kinetics