SUMMER 2011
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, the solid state and spectroscopy are additional topics 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.

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REQUIRED TEXT: The text for the course is Chemical Principles (6th Edition) by Steven S. Zumdahl Houghton Mifflin Co. (2009). 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 prior to lecture. The recitation is led by a teaching assistant to go over problem-solving strategies and homework.

GRADING: There are regularly scheduled quizzes in recitation (100 pts), three exams (100 pts) and a comprehensive final (200 pts) – one can drop 100 pts (an exam equivalent), but there are no make-up exams. The course grades are curved. Exams will be given during the lecture period and a comprehensive final. Quizzes will be given in the recitation sections. Suggested homework assignments will be recommended, but not collected and graded.

Full details for the course, including the syllabus and course calendar, will be provided once classes begin and you 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:

1403D - Session I (MTWR May 23-July1)

REVIEW OF BASIC CHEMICAL CONCEPTS
Chapter 2 Atoms, Molecules and Ions
Chapter 20 The Nucleus – selected portions
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 S1403D - Session I (MTWR July 5-August 12)

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