Administrative Unit: Science

Course Prefix and Number: CHEM 112

Course Title: Chemistry II

Number of Credit Hours: 3 Lecture Hours: 4 Laboratory Hours: 0

Catalog Description: A continuation of CHEM 110. Topics to be covered include kinetics, equilibrium, electrochemistry, nuclear chemistry, and coordination complexes. Students majoring in Biology or Chemistry must earn a grade of C or better. Prerequisite: CHEM 110. Offered Spring.

Prerequisite(s)/Corequisite(s): CHEM 110.

Text(s): Current editions of:


Chemistry. J. Olsted and G. Williams, Wiley.


Course Objectives:

• To apply the principles of thermodynamics to chemical reactions.
• To analyze reactions in terms of chemical kinetics.
• To examine chemical equilibrium, acid-base chemistry, and electrochemistry.
• To predict nuclear stability and describe nuclear reactions.
• To describe metal complexes and their equilibria.

Measurable Learning Outcomes

• Utilize all information and skills learned in CHEM 110.
• State the three laws of thermodynamics.
• Distinguish between enthalpy, entropy, and Gibbs free energy.
• Use tabulated thermodynamic data to determine whether reactions are spontaneous or nonspontaneous.
• Determine rate laws and orders of reactions.
• Relate concentration and time for first- and second-order reactions.
• Define the rate determining step in a reaction and explain catalysis.
• Explain chemical equilibrium and use Le Chatelier’s principle.
• State the Arrhenius, Lewis, and Bronsted-Lowry definitions of acids and bases.
• Compute pH of weak and strong acid solutions, and of buffer solutions.
• Calculate solubility product constant, and vice versa.
• Diagram galvanic and electrolytic cells, labeling their various components.
• Calculate standard cell potentials, and calculate cell potentials using the Nernst equation.
• Identify and describe coordination compounds.
• Predict nuclear stability and differentiate between types of nuclear reactions.
• Identify types of radiation.
• Calculate half-life and relate the amount of radionuclide in a given sample of time.
• Name simple organic compounds.
• Identify the monomer unit in a polymer.
• Describe basic biochemicals such as amino acids, carbohydrates, lipids, and/or nucleic acids.

Topical Outline (major areas of coverage):

• Chemical Kinetics
• Chemical Equilibrium
• Hydrogen, Oxygen, Water
• Aqueous equilibria
• Thermodynamics
• Electrochemistry
• The Main-Group Elements
• Transition Elements
• Metals and Solid-State Materials
• Nuclear Chemistry
• Organic Chemistry
• Biochemistry

Recommended maximum class size for this course: 35

Library Resources: Online databases are available at http://www.ccis.edu/offices/library/resources.asp. You may access them from off-campus using your eServices login and password when prompted.

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Name: ______________________________ Signature: ______________________________

Date: October 30, 2004

NOTE: The intention of the master syllabus is to provide an outline of the contents of this course, as specified by the faculty of Columbia College, regardless of who teaches the course, when it is taught or where it is taught. Faculty members teaching this course for Columbia College are expected to facilitate learning pursuant to the course objectives and cover the subjects listed in the topical outline. However, instructors are also encouraged to cover additional topics of interest so long as those topics are relevant to the course’s subject. The master syllabus is, therefore, prescriptive in nature but also allows for a diversity of individual approaches to course material.