

GENERAL CHEMISTRY II - 5 Credit(s)

SOCOL, STE - SPRING 2012

Days: TTh 08:30AM - 09:50AM Room: A 211

Days: F 09:00AM - 09:50AM Room: A 211

Course Begins: 1/13/2012 Course Ends: 5/11/2012 Last day to Withdraw: 4/13/2012

Lab A01	Days: M	08:00AM - 10:50AM	Room: A 229
Lab Begins: 1/16/2012 Lab Ends: 5/7/2012 Last day to Withdraw: 4/6/2012			
Lab A02	Days: M	01:00PM - 03:50PM	Room: A 229
Lab Begins: 1/16/2012 Lab Ends: 5/7/2012 Last day to Withdraw: 4/6/2012			

Lab Hrs: 3.00	Lecture Hrs: 4.00	PCS: 1.1	Articulated: Y	How:
IAI Core:	IAI Majors: CHM912			

Course Description:

General Chemistry II is a continuation of General Chemistry I. It covers solution chemistry, thermodynamics, kinetics, acids and bases, chemical equilibrium, electrochemistry, nuclear reactions, and coordination chemistry. Laboratory experiments correlate with lecture material.

Course Prerequisite:

CHM 165 with a grade of C or higher.

Course Objectives:

Cognitive

1. Be able to determine rate laws
2. Be able to propose reaction mechanisms
3. Describe the basic concepts of thermodynamics and electrochemistry
4. Be able to determine spontaneity of a chemical reaction from tabulated thermodynamic data
5. Calculate equilibrium problems involving acids, bases, and slightly soluble precipitates
6. Describe the descriptive chemistry of hydrogen, oxygen, and water

Affective:

1. Appreciate how chemical theories are developed
2. Appreciate the relationship between kinetics and thermodynamics
3. Develop a concern for chemical safety

Manipulative:

1. demonstrate the ability to use of simple laboratory apparatus such as electronic balances, burets, and spectrophotometers
2. use computer spreadsheets

Course Outline:

- I. Solutions and Their Properties: Energetics of the Solution Process
 - A. Factors Affecting Solubility
 - B. Solution Concentration Units
 - C. Colligative Properties of Solutions

- II. Chemical Kinetics Rate Laws and Reaction Order
 - A. Experimental Determination of Rate Laws
 - B. First, Second and Zeroth Order Reactions
 - C. The Arrhenius Equation
 - D. Catalysis

- III. Chemical Equilibrium
 - A. The Equilibrium State
 - B. Equilibrium Constants and Their Applications
 - C. Le Chatelier's Principle
 - D. Catalysis

- IV. Aqueous Equilibria: Acids and Bases
 - A. The Bronsted-Lowry Theory
 - B. Acid and Base Strength
 - C. Dissociation of Water and the pH Scale
 - D. Calculating Equilibrium Concentrations in Solutions of Weak Acids
 - E. Hydrolysis of Salts
 - F. Factors Which Determine Acid Strength
 - G. Lewis Acids and Bases

- V. Application of Aqueous Equilibria
 - A. Neutralization Reactions
 - B. The Common Ion Effect
 - C. Buffer Solutions
 - D. The Henderson-Hasselbach Equation
 - E. Strong Acid Strong Base Titrations
 - F. Weak Acid Strong Base Titrations
 - G. Weak Base Strong Acid Titrations
 - H. Polyprotic Acids
 - I. Solubility Equilibria

- VI. Thermodynamics: Entropy, Free Energy and Equilibrium
 - A. Nature of Spontaneous Processes
 - B. Entropy and Probability
 - C. Entropy and Temperature
 - D. The Second Law of Thermodynamics
 - E. Standard Free Energy Changes
 - F. Free Energy Changes at Nonstandard Conditions
 - G. Free Energy and Chemical Equilibrium

- VII. Electrochemistry
 - A. Standard Reduction Potentials
 - B. The Nernst Equation
 - C. Electrochemical Determination of pH
 - D. Electrolysis and Electrolytic Cells
 - E. Quantitative Aspects of Electrolysis

- VIII. Oxygen, Hydrogen and Water
 - A. Isotopes of Hydrogen
 - B. The Chemistry of Hydrogen
 - C. The Chemistry of Oxygen and Ozone
 - D. Hydrogen Peroxide
 - E. The Chemistry of Water

F. Hydrates

IX. Nuclear Chemistry

- A. Nuclear Reactions and Their Characteristics
- B. Nuclear Reactions and Radioactivity
- C. Nuclear Decay Rates
- D. Energy Changes During Nuclear Reactions
- E. Nuclear Fission and Fusion
- F. Nuclear Transmutation

Laboratory Experiments

1. Determining the Percent Sodium Hypochlorite in Commercial Bleaching Solutions
2. Solutions
3. Determining Molar Mass by Freezing Point Depression in Naphthalene
4. Determining the Rate Law for the Crystal Violet Hydroxide Reaction
5. Studying the Reaction Rate of Potassium Permanganate and Oxalic Acid
6. Studying the Kinetics of a Chemical Reaction
7. Evaluating the Calcium Ion Content of Commercial Dried Milk Products
8. Introducing Chemical Equilibrium
9. Evaluating the Equilibrium Constant for the Reaction of Iron(III) with Thiocyanate Ion
10. Estimating the pH of Household Products Using Red Cabbage Indicator
11. Monitoring Acid-Base Titrations with a pH Meter
12. Determining the Common Ion Effect on the Solubility of Potassium Hydrogen Tartrate
13. Determining the pKa of an Acid-Base Indicator
14. Properties of Buffers

Special Needs Statement:

McHenry County College offers support services for students with special needs. It is the student's responsibility to meet with the Special Needs Coordinator and provide current documentation regarding his/her disability. Please stop in or call the Special Needs Department, room A-260, 815-455-8676, as soon as possible if you would like more information about the accommodations that are available. In addition, it is important for you to discuss those accommodations with me so you are able to fully participate in this course.

Academic Integrity:

As an educational community, McHenry County College values the pursuit of academic excellence and integrity. In accordance with this philosophy and Chapter 10, Act 5 of the 1994 Illinois Community College Act, academic dishonesty in any form, including cheating, plagiarism, and all other acts of academic theft, is considered intolerable. Appropriate sanctions, up to and including suspension from the college will be imposed by authorized College personnel.

Copyright Policy:

The College will maintain current procedures and guidelines to ensure that all staff and students comply with applicable copyright laws and other intellectual property protection laws. The College will encourage staff and students to engage in the development of intellectual property and facilitate ownership protections with respect to such development of intellectual property.

The College expects that staff and students will act responsibly and ethically in a manner consistent with all copyright laws and College copyright procedures and guidelines. This policy authorizes the College to adopt and maintain such procedures and guidelines necessary to ensure compliance with copyright laws and to facilitate ownership protection with respect to the development of intellectual property.

Student Code of Conduct and the Judicial Process:

Consistent with the McHenry County College mission is an expectation that students will govern themselves in terms of appropriate behavior with emphasis on self-respect and respect for others. It is the practice of the College to respect the properly exercised rights of its students. The College recognizes a student's rights within the institution to freedom of speech, inquiry and assembly; to the peaceful pursuit of education; and to the reasonable use of services and facilities of the College.

The College has adopted a Student Code of Conduct and judicial process in order to maintain a learning environment of respect, civility, safety, and integrity for all members of the College community.

Whenever possible, sanctions for violations of the Student Code of Conduct may be educational in nature. However, violations affecting the health and safety of members of the College community are deemed to be the most serious. Therefore, acts of violence, threats or dangerous behavior are most likely to result in a suspension from the college. Violations of the academic dishonesty policy may also result in suspension or expulsion from the institution and/or reduced or failing grade.

Children on Campus:

For the safety of children on campus, children (e.g., less than 16 years of age) are not permitted on campus unattended by a parent/guardian, except when they are attending classes offered by the College for children. The College requires that no children be allowed into a classroom/laboratory environment, including the Testing Center, Learning Center and computer labs, solely for the purpose of a parent/guardian to provide direct supervision of his/her child.

Teaching Schedule:

The scheduling of the activities and teaching strategies on this syllabus, but not the objectives or content, may be altered at any time at the discretion of the instructor.