



CHEM 023: General Chemistry II with Lab

Term: 2020 Winter Session
Instructor: Staff
Language of Instruction: English
Classroom: TBA
Office Hours: TBA
Class Sessions Per Week: 6
Total Weeks: 4
Total Class Sessions: 25
Class Session Length (minutes): 145
Credit Hours: 5
Total Lab sessions: 10

Course Description:

As a continuation of CHEM 013, this course mainly emphasizes on following topics: kinetics, chemical thermodynamics, equilibrium, electrochemistry, nuclear chemistry, and descriptive chemistry. Students will build a further understanding of the related theoretical principles through a hands-on experience of basic laboratory.

Course Materials:

1. Textbook :
Chemistry: The Molecular Nature of Matter and Change, 8th Ed., by Martin S. Silberberg
2. Lecture notes

Course Format and Requirements:

Material involves taking time to think things through, develop the knowledge (or process) and practice this. It is also very helpful to test yourself on your knowledge development. Using the quiz or exam as a means to test if you have learned something could be too late to determine you still have a gap in knowledge. Remember, lecture is very important in seeing process and models and hearing concepts and their derivation and application BUT is not the beginning and end of learning. It would be unusual to learn something simply from sitting in lecture.

**Labs**

The goal of the labs is to provide a hands-on experience with General Chemistry material and to enhance abilities in scientific methodology, critical thinking, and communicating about Chemistry. Attendance is mandatory. No make-up labs will be provided.

Attendance

Attendance is mandatory. More than three unexcused absences will result in an automatic reduction in your participation grade, for instance from A- to B+. Your active participation in the class is expected and constitutes part of your grade.

Grading Scale:

A+: 98%-100%

A: 93%-97%

A-: 90%-92%

B+: 88%-89%

B: 83%-87%

B-: 80%-82%

C+: 78%-79%

C: 73%-77%

C-: 70%-72%

D+: 68%-69%

D: 63%-67%

D-: 60%-62%

F: Below 60%

Course Assignments:**Quizzes**

Quizzes will usually consist of True-False, multiple choices and short answer questions. 7 quizzes will be given and the two lowest will be dropped.

Exams

Two midterms and one final exam will be given in this class. The exams will be most similar to the questions in the textbook, and the recitation quiz questions. Sample exams will be distributed prior to each midterm. A sheet of standard formulas and physical constants will be provided with



each exam. All other notes, books, programs or other prepared materials may not be used during the test. Calculators may not be shared.

Labs

Lab grading depends on in-class worksheets, participation, lab reports and the lab final exam or presentation. Specific due dates for projects and more detailed lab policies will be given in lab. Attendance at labs is mandatory. Students missing 3 or more labs, whether excused or unexcused, will receive an F grade for the course.

Course Assessment:

Top 5 Quizzes	10%
Labs	15%
Midterm Exam 1	20%
Midterm Exam 2	20%
Final Exam	35%
Total	100%

Course Schedule:

Week	Topics	Activities
1.	Go through syllabus Review on CHEM 011 Chemical Kinetics: Introduction to Rate Rate Law: Concentration on the Reaction Rate The integrated Rate Law Temperature, Reaction Rate and Reaction Mechanism Catalysis Chemical Equilibrium:	Homework Assignment Quiz 1



	Constants in a chemical equilibrium Expressing and Calculating Equilibrium Constants	
2.	Chemical Equilibrium: Predicting the Direction of Change Finding Equilibrium Concentrations Le Chatelier's Principle-The Equilibrium Law Acid and Bases: The Nature and Definition of Acids and Bases Strength of acid related to structure The pH value, Strong Acids, Weak Acids; Base solutions The Acid- Based Properties of Ions and Salts Polyprotic Acid Lewis Acids and Bases	Homework Assignment Quiz 2 Midterm 1 Quiz 3
3.	Aqueous Ionic Equilibrium: Introduction to Buffers Buffer Effectiveness Titrations and PH Curve K _{sp} and solubility; Selective Precipitation and Complex Ion Equilibrium Free Energy and Thermodynamics: 1st Law of Thermodynamics	Homework Assignment Quiz 4 Midterm 2 Quiz 5



	<p>Entropy and the Second Law of Thermodynamics</p> <p>Conservation of Energy, Internal Energy, Enthalpy</p> <p>3rd Law of Thermodynamic</p> <p>Free energy</p> <p>Electrochemistry:</p> <p>Galvanic/Voltaic Cells</p> <p>Balancing Reactions in Galvanic Cells</p>	
4.	<p>Electrochemistry:</p> <p>Standard Electrode Potentials;</p> <p>Cell Potential, Free Energy and the Equilibrium Constants</p> <p>Cell Potential and Concentration</p> <p>Batteries and Electrolysis</p> <p>Corrosion</p> <p>Radioactivity and Nuclear Chemistry:</p> <p>Nuclear transmutation;</p> <p>Biological effects of radiation</p> <p>Course Summary and Review for Final</p>	<p>Homework Assignment</p> <p>Quiz 6</p> <p>Final exam</p>

Lab Schedule:

Lab 1: Catalysis

Lab 2: Kinetics of the reaction between hydrogen peroxide and iodide ion

Lab 3: Chemical Equilibrium 1



Lab 4: Chemical Equilibrium 2

Lab 5: Acids and Bases I

Lab 6: Acids and Bases II

Lab 7: Buffers

Lab 8: Thermodynamics

Lab 9: Electrochemical cells

Lab 10: Galvanic Cells

Lab Final Presentation

Academic Integrity:

Students are encouraged to study together, and to discuss lecture topics with one another, but all other work should be completed independently.

Students are expected to adhere to the standards of academic honesty and integrity that are described in the Shanghai Normal University's *Academic Conduct Code*. Any work suspected of violating the standards of the *Academic Conduct Code* will be reported to the Dean's Office. Penalties for violating the *Academic Conduct Code* may include dismissal from the program. All students have an individual responsibility to know and understand the provisions of the *Academic Conduct Code*.

Special Needs or Assistance:

Please contact the Administrative Office immediately if you have a learning disability, a medical issue, or any other type of problem that prevents professors from seeing you have learned the course material. Our goal is to help you learn, not to penalize you for issues which mask your learning.