

Chemistry 220 General Chemistry II
Course Syllabus

Credits: 4 credits, 3-hr lecture/1-hr recitation workshop/3 hr laboratory

Prerequisites: ENG 092 / CHE 210 (General Chemistry I)

Textbook: Silberg **Chemistry: The Molecular Nature of Matter and Change 9th Edition**

Lab Manual: CHEMISTRY, The Central Science, Tenth Ed., J. Nelson
and Kemp, Prentice Hall, ISBN: 0-13-146488-4

Course Description: This is the second semester of a two semester course in general chemistry. The materials to be covered are: chemical kinetics, chemical equilibrium, acids and bases, solubility, thermochemistry (2nd law), electrochemistry, nuclear chemistry and functional groups of organic compounds.

Course Objectives:

The student will :

- Know the principles of chemical kinetics and reaction mechanisms, chemical equilibrium, thermodynamics, electrochemistry, nuclear chemistry.
- Recognize organic compounds in particular aliphatic and aromatic hydrocarbons and study of the principal functional groups.
- Know about macromolecules with emphasis in enzymes and proteins.
- Manipulate basic laboratory equipment and perform procedures related to Chemical Kinetics, Ionic Reactions, Chemical Analysis, etc.

General Education Competencies:

B1: Demonstrate knowledge of defining principles and canonical ideas in arts and humanities; cultural and historical studies; social and behavioral sciences; and the mathematical, physical, and life sciences.

A1: Utilize deductive and inductive reasoning skills with special emphasis on problem-solving, analysis and clarity of understanding.

C3: Organize, analyze, evaluate, and treat information critically in order to use and present it in a cohesive and logical fashion.

C4: Interpret data and observations; comprehend research material. Be able to present and explain conclusions

Pathways Competencies and Methods of Assessment

Scientific World

1) Identify and apply the fundamental concepts and methods of a discipline or interdisciplinary field exploring the scientific world, including, but not limited to: computer science, history of science, life and physical sciences, linguistics, logic, mathematics, psychology, statistics, and technology-related studies.

Assessment:

Assignment: Specific questions during class work during recitation and homework

Assessment: Specific questions in the partial and final exams linked to concepts' application/understanding

2) Demonstrate how tools of science, mathematics, technology, or formal analysis can be used to analyze problems and develop solutions.

Assessment:

Assignment: Specific questions during class work during recitation and homework

Assessment: Specific questions in the partial and final exams linked to problem solving skills and specific questions in writing a lab report

3) Articulate and evaluate the empirical evidence supporting a scientific or formal theory.

Assessment:

Assignment: Lab work

Assessment: Lab reports and specific questions during final lab exams

Grading Policy: This course has two portions, the lecture and the lab portion. The grade break down is as such:

A	93-100
A ⁻	90-92
B ⁺	87-89
B	83-86
B ⁻	80-82
C ⁺	77-79
C	70-76
D	60-69
F	< 60

Note: Any student that fails the Lab portion of the class will automatically fail the *whole* class regardless of how well they are performing in the lecture portion.

Incomplete Grade (INC)- The grade of Incomplete (INC) is given in regular courses upon request of the student for personal emergencies that are verifiable. The faculty member has the responsibility to provide INC grade only to those students **who are passing the course**. The student has the responsibility to take the initiative in completing the work, and is expected to make up the incomplete work during the first semester in residence after receiving the grade of Incomplete. If the student does not make up the incomplete during the following semester after receiving it, **the faculty member may give an F grade without further consultation with the student**. If after the end of the first semester the INC remains on the record it will be designated as an F and will be computed in the student's GPA. There is no R grade in this course.

Additional information on the college grade policy can be obtained at <http://www.hostos.cuny.edu/Administrative-Offices/Office-of-the-Registrar/Academic-Info/Grades-Policy>.

WU Grade – Given for non-attendance. This grade is included in the computation of the GPA and counts as a failure (F). It is a punitive grade, you may be responsible for a part or a whole of your tuition fee.

Chapter	Topics	
16	Kinetics Collision Theory Rate Law Determination Integrated Rate Law Half-Life Arrhenius Equation Reaction Coordinates Reaction Mechanisms	
17	Equilibrium Equilibrium Constants Calculating Equilibrium Constants and equilibrium Concentrations Le Chateliers Principle	
18	Acids and Bases Arrhenius and Bronsted Lowry Definition Ka, Kb, Pka, Pkb pH calculations for strong and weak acids and bases Polyprotic Acids	
19	Buffer Solutions Henderson Hasselbalch Equations	

	Titration Curves K_{sp} Solubility Common Ion Effect	
20	Second Law of Thermodynamics Entropy Gibbs Free Energy Spontaneous vs Non-Spontaneous dG and equilibrium	
21	Electrochemistry Oxidation-Reduction reactions Galvanic Cells Standard Electrode Potentials dG and E_{cell} Nernst Equation Electrolytic Cells	
24	Nuclear Chemistry Types of Decay Kinetics of Radioactivity Mass Defect	
15	Organic Chemistry Nomenclature Functional Groups	

Lab Schedule

SCHEDULE OF EXPERIMENTS CHEM 220 Laboratory

<u>DATE</u>	<u>EXPERIMENT TITLE</u>	<u>EXP. #</u>
Week 1	Drawer assignment Discussion of Safety Rules for Laboratory Sessions Attendance and Grading Policies Directions for Writing a Laboratory Report Identification of an Unknown Cation (to be concluded in the second lab period: two weeks)	Handout
Week 2	Identification of an Unknown Cation	Handout
Week 3	Rates of Chemical Reactions I: A Clock Reaction	29
Week 4	Chemical Equilibrium and Le Chatelier's Principle	23
Week 5	The Chemistry of Oxygen: Basic and Acidic Oxides and the Periodic Table	18
Week 6	Determination of the Dissociation Constant of a Weak Acid (Parts C, D)	25
Week 7	Hydrolysis of Salts and pH of Buffer Solutions (Part A)	24
Week 8	Buffers	Handout
Week 9	Determination of the Solubility-Product Constant of a Sparingly Soluble Salt	27
Week 10	Determination of Orthophosphate in Water	34, 10 th Edition
Week 11	Electrochemical Cells and Thermodynamics	17
Week 12	Molecular Geometry: Experience with Models	40
Week 13	Preparation of Aspirin and Oil of Wintergreen Cleaning of Glassware and Check Out	41

