

Course Outline: Fall-2023

Course Title : Engineering Chemistry-1
Course Code : CHE109
Pre- requisite : None
Class Time & Office Hour :

Time & Date	Class		Lab	Office time
	11:50-1:20	3:10-4:40	4:50-6:50	
Sun	CHE109 S-09 FUB-501	CHE109 S-10 FUB-601	CHE109 Lab S-09 Room 724	1:30-3:10 FUB-9th floor
Mon				
Tue	CHE109 S-09 FUB-501	CHE109 S-10 FUB-601	CHE109 Lab S-10 Room 723	1:30-3:10 FUB-9th floor
Wed				
Thu				

Make up Schedule : Make-up classes will be suitably arranged.
Course Instructor : **Dr. Joyanta Kumar Saha**
Contact : **01923616020**
Email : joyanta.saha@ewubd.edu
Office :

Objectives: Aims to give a basic knowledge of atoms and molecules, the concept of chemical bonding, and the structure of a molecule, introduce the mole concept and ideas of solution concentrations, acid-base titration, and how structure relates to bonding and bulk properties. The course also treats phases and solution behavior, equilibrium and thermodynamics, electrochemistry, and the basics of biochemistry.

Course Learning Outcomes:

CLO1: Understand the fundamentals and application of current chemical theories.

CLO2: Apply knowledge in problem-solving, critical thinking and analytical reasoning.

CLO3: Design and carry out experiments and accurately record and analyze the results of such experiments.

Course Contents/Description:

Mid Exam

Atomic structure and properties: Atomic particles, atomic number, mass number, atomic orbitals, isotopes, electronic configurations of atoms, Pauli exclusion principle, Hund's rule, Aufbau principles atomic models/postulations, periodic table and periodic properties of elements, semiconductor, photoelectric effect, electromagnetic radiation.

Chemical Bonding: Forces between atoms and molecules, Forces in Solid bindings, ionic bond, covalent bond, metallic bond, hydrogen bond, hybridization, valence bond theory (VBT), VESPER theory, the geometry of molecules.

Properties of gases: Gas Laws (Boyles law, Charles's Law, combined gas law, Gay-Lussac law, ideal gas law, Dalton's law of partial pressure). Mathematical problems.

Acid and Bases: Strong and weak acids/bases, the relative strength of acids/bases, pH and buffer solutions, neutralization curves, acid-base titration, and Measurement of pH.

Oxidation and Reduction: Oxidants and reductants, oxidation number, balancing of redox reactions.

Chemical equilibrium and thermodynamics: Chemical equilibrium; the concept of chemical thermodynamics and thermochemistry.

Final Exam

Chemical Solution: Types of solutions and ways of expressing, concentration, colligative properties; selective organic compounds: aliphatic and aromatic organic compounds with their derivatives.

Chemical Kinetics: Rate of reaction, rate law, order of reaction, molecularity of reaction, kinetics constant, half-life of reaction, Arrhenius equation, collision theory, transition state theory, catalysis and its classifications.

Electrochemistry: Electrode, electrolyte, standard hydrogen electrode, electrolysis, Electrochemical cell, electromotive force, electrode reactions, reduction potential, the chemical series, electroplating, product deposition within the electrodes, Galvanic cell, Daniel cell, dry cell, Hydrogen fuel cell.

Basics of organic chemistry: Introduction of aliphatic and aromatic hydrocarbons, the nomenclature of various organic compounds, synthesis of various hydrocarbons (alkane, alkene, alkyne, alcohol, acid, benzene, phenol, etc), important organic reactions such as addition reaction, elimination reaction, substitution reaction, Friedel craft reactions, phenol, and its derivatives; alcohols and its derivatives.

Basics of biochemistry: Amino acids, peptides and proteins, hemoglobin as allosteric model, enzymes, cofactors, bioenergetics, membrane transport, metabolism of proteins, carbohydrates, lipids and nucleic acid

Chemical weapon conventions.

Books:

1. General Chemistry 8th Ed, by Darrell D. Ebbing, Steven D. Gammon
2. Chemistry 9th Ed by Steven S. Zumdahl, Susan A. Zumdahl
3. Chemistry, 12th Edition, by Raymond Chang and Kenneth Goldsby

Evaluation and Grading Policy:

Quizzes	10%
Presentations/Viva	10%
Attendance	5%
Mid Term Exam	25%
Term Final Exam	25%
Lab	25%

Grading Policy:

Marks (%)	Letter Grade	Grade Point	Marks (%)	Letter Grade	Grade Point
80 >=	A+	4.00	55-59	B-	2.75
75-79	A	3.75	50-54	C+	2.50
70-74	A-	3.50	45-49	C	2.25
65-69	B+	3.25	40-44	D	2.00
60-64	B	3.00	<40	F	0.00

Exam Schedule: Last day of classes 27 December 2023

Exam	Date	
Mid		Before 26 November 2023
Final	Sunday	31 December 2023

Special Instructions:

- **An apron is mandatory for Lab class.**
- Students are required to come to class on time and are expected to attend all classes and examinations.
- **No section change is allowed for class or lab.**
- **No make-up lab is allowed without proper reason.**
- All mobile phones MUST be turned to silent mode during class and exam periods.
- Plagiarism in assignments will not be allowed.
- Cheating in exams is a punishable offense and strict actions will be taken according to EWU rules.



Dr. Joyanta Kumar Saha