



Jordan University of Science and Technology
Department of Chemistry
Course Syllabus
Fall 2018/2019

Course Information	
Course Number: CHEM 108	Course Name: General and Organic Chemistry
Credit Hours: 4	Contact Hours: 4
E-learning web address: www.just.edu.jo/e-learning	

Instructor Information	
Coordinator:	Instructor: Prof. Ahmad Al-Ajlouni
Office Hours: Sun, Tue 12 – 1, Mon, Wed 11 -12	Office Location: N4-L0 (الطبية)
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Course Catalog
Course Description: (Give a brief description of the course as it appears in the study plan) CHEM 108 course focuses on some concepts of general chemistry and the basic of organic chemistry. It starts with the general part covering: Units & Measurements, atomic structure and periodic properties, types of chemical reactions, mole & mass relationships in chemical reactions, chemical bonding, ionic and covalent compounds, solutions, and acids/bases. The second part of this course includes the basic principles of organic chemistry, such as structures of different functional groups, naming, physical properties, preparation and some basic reactions and mechanisms. The course also covers all kind of isomers and stereochemistry.
Textbook: (title, author, and year) <i>Fundamental of General, Organic and Biological Chemistry</i> (8 th Ed), Authors: J. McMurry 2017.
References and Supplement Materials: <ol style="list-style-type: none">1. Organic Chemistry: A Short Course (13th Edition) by Harold Hart, Christopher M. Hadad, Leslie E. Craine, David J. Hart 2011.2. Fundamentals of Organic Chemistry (7th Edition) by John E. McMurry 2011.

Evaluation	
Mid-Term Exam	40%
Final Exam	60%
Total	100%

Outcomes of instruction: By the end of the course, students should be able to

- 1- Know the units of measurements, conversion of units and significant figures. (5%)
- 2- Understand the atomic and electronic structures, and how elements are organized in the Periodic Table and their periodic properties. (5%)
- 3- Understand the tendency of elements to gain, lose or share electrons, and the basic of bonding and forming ionic and covalent compounds. (10%)
- 4- Become familiar with different type of chemical reactions, and perform calculations from balanced chemical reactions. (5%)
- 5- Know the properties of solutions and their concentration units. (5%)
- 6- Recognize acids and bases, and their properties and reactions (10%)
- 7- Understand the structures of different organic molecules, and able to recognize and draw structures (10%)
- 8- Able to name organic molecules. (10%)
- 9- Know the physical properties of each functional groups. (10%)
- 10-Get familiar with all kind of isomers and stereochemistry. (10%)
- 11-Understand major reactions of functional groups including preparation reactions. (15%)
- 12-Recognize the acidic/basic properties of some organic compounds. (5%)

Topics to be Covered

Topics

Part I : General Chemistry (27 hours)

Measurements and Units (3 hours)

- a) Physical Quantities: Units and Scientific Notation
- b) Measuring Mass, Length, and Volume
- c) Measurement and Significant Figures
- d) Rounding Off Numbers
- e) Unit Conversions
- f) Temperature units
- g) Density and Specific Gravity

Atoms and the Periodic Table (4 hours)

- a) Atomic Theory and the Structure of Atoms
- b) Elements and Atomic Number
- c) Isotopes and Atomic Weight
- d) The Periodic Table
- e) Some Characteristics of Different Groups
- f) Electronic Structure of Atoms
- g) Electron Configurations
- h) Electron Configurations and the Periodic Table
- i) Electron-Dot Symbols

Ionic Compounds (3 hours)

- a) Ions and the Octet Rule
- b) Ions of Some Common Elements
- c) Periodic Properties and Ion Formation
- d) Naming of Ions
- e) Ionic Bonds and compounds
- f) Naming Ionic Compounds
- g) Some Properties of Ionic Compounds

***Molecular Compounds and Covalent Bonding* (4 hours)**

- a) Covalent Bonds
- b) Covalent Bonds and the Periodic Table
- c) Multiple Covalent Bonds
- d) Coordinate Covalent Bonds
- e) Characteristics of Molecular Compounds
- f) Molecular Formulas and Lewis Structures
- g) Drawing Lewis Structures
- h) The Shapes of Molecules
- i) Polar Covalent Bonds and Electronegativity
- j) Polar Molecules

***Classification and Balancing of Chemical Reactions* (3 hours)**

- a) Balancing Chemical Equations
- b) Precipitation Reactions and Solubility Guidelines
- c) Acids, Bases, and Neutralization Reactions
- d) Redox Reactions
- e) Recognizing Redox Reactions
- f) Net Ionic Equations

***Chemical Stoichiometry: Mole and Mass Relationships* (3 hours)**

- a) The Mole and Avogadro's Number
- b) Gram-Mole Conversions
- c) Mole Relationships and Chemical Equations
- d) Mass Relationships and Chemical Equations
- e) Limiting Reagent and Percent Yield

***Solutions* (3 hours)**

- a) The Solution Process and Solubility
- b) Temperature and Pressure Effect on Solubility: Henry's Law
- c) Units of Concentration
- d) Dilution
- e) Ions in Solution: Electrolytes
- f) Properties of Solutions

g) Osmosis and Osmotic Pressure

Acid and Base (4 hours)

- a) Acids & Bases Definitions
- b) Acid and Base Strength
- c) Acid Dissociation Constants
- d) Water as Both an Acid and a Base
- e) Measuring Acidity in an Aqueous Solution:
- f) Working with pH
- g) Acid and Base Equivalentents
- h) Some Common Acid-Base Reactions
- i) Acidity and Basicity of Salt Solutions
- j) Buffer Solutions
- k) Titration

Part II: Organic Chemistry (31 hours)

Introduction to Organic Chemistry: Alkanes (6 hours)

- a) The Nature of Organic Molecules
- b) Families of Organic Molecules: Functional Groups
- c) The Structure of Organic Molecules: Alkanes and Their Isomers
- d) Drawing Organic Structures
- e) The Shapes of Organic Molecules
- f) Naming Alkanes
- g) Properties of Alkanes
- h) Reactions of Alkanes
- i) Cycloalkanes: structure and naming

Alkenes, Alkynes, and Aromatic Compounds (6 hours)

- a) Alkenes and Alkynes
- b) Naming Alkenes and Alkynes
- c) The Structure of Alkenes: Cis-Trans Isomerism
- d) Properties of Alkenes and Alkynes
- e) Types of Organic Reactions
- f) Addition Reactions of Alkenes
- g) Alkene Polymers
- h) Aromatic Compounds and the Structure of Benzene
- i) Naming Aromatic Compounds
- j) Reactions of Aromatic Compounds

Stereoisomerism (4 hours)

- a) Chirality and Enantiomers.
- b) Stereogenic Centers; the Stereogenic Carbon Atom.
- c) Configuration and the R-S Convention.
- d) The E-Z Convention for cis-trans Isomers.
- e) Polarized Light and Optical Activity.
- f) Properties of Enantiomers
- g) Diastereomers and Meso compounds

h) Stereochemistry and chemical reactions

Some Compounds with Oxygen, Sulfur, or a Halogen (4 hours)

- a) Alcohols, Phenols, and Ethers
- b) Naming Alcohols
- c) Properties of Alcohols
- d) Reactions of Alcohols
- e) Phenols
- f) Acidity of Alcohols and Phenols
- g) Ethers
- h) Thiols and Disulfides
- i) Halogen-Containing Compounds

Aldehydes and Ketones (4 hours)

- a) The Carbonyl Group
- b) Naming Simple Aldehydes and Ketones
- c) Properties of Aldehydes and Ketones
- d) Some Common Aldehydes and Ketones
- e) Oxidation of Aldehydes
- f) Reduction of Aldehydes and Ketones
- g) Addition of Alcohols: Hemiacetals and Acetals

Carboxylic Acids and their Derivatives (5 hours)

- a) Carboxylic Acids and Their Derivatives: Properties and Names
- b) Acidity of Carboxylic Acids
- c) Reactions of Carboxylic Acids: Ester and Amide Formation
- d) Hydrolysis of Esters and Amides
- e) Polyamides and Polyesters
- f) Phosphoric Acid Derivatives

Amines (2 hours)

- a) Classifying Amines
- b) Naming and Drawing Amines
- c) Properties of Amines
- d) Heterocyclic Nitrogen Compounds
- e) Basicity of Amines
- f) Amine Salts

End of Course revision, and practice on sample questions (2 hours)