

## Chemistry 110

Course Title	English Code /No	contact hours / week			C.H.
		Th.	Pr.	Tr.	TCH
General Chemistry I	Chem. 110	3	-	-	3
Pre-requisites:	None				

Brief contents, to be posted in university site and documents(45- lines):

This course will provide students with a comprehensive overview of the major areas of chemistry. Chemical principles for each topic under discussion are presented together with their foundation in atomic and molecular structure. Topics covered range from atomic and molecular theory to the descriptions of chemical reactivity and reactions, quantitative methods in chemistry, reactions in aqueous media, and chemical bonding, chemical and ionic equilibria, and basic organic chemistry. Applications of chemistry, "the central science" are discussed throughout the lectures. Lectures are included, giving students the opportunity to practice their knowledge, extensive experience in problem solving. Upon completion of the course the student will have gained a strong foundation for the further study of chemistry, and for the application of chemical principles in a variety of other fields.

### Objectives :

- This course is designed to provide basic concepts of general chemistry.
- Classification of matter and units
- Atoms, molecules and ions.
- Mass relationships in chemical reactions and solutions
- Gases, gas laws and gas stoichiometry
- Quantum theory and the electronic structure of atoms
- Periodic relationship between the elements
- Basic concepts of chemical bonds
- Chemical and ionic equilibrium
- Basic principles of organic and biochemistry chemistry.

### Course Outcomes :

Students who successfully complete this course should have a good background for pursuing other courses in chemistry and other sciences that require knowledge of the material addressed in Chemistry. One of the keys to success in a Chemistry Course is to do lots of problems. In addition to Chemistry textbooks, a problem solving books exist.

Students will be able to:

- 1-Identify types of matter and uses of basic units
- 2- Define the structure of the atom in terms of the nucleus with protons and neutrons, and electrons.
- 3- Name inorganic compounds.
- 4- Carry out chemical calculations.
- 5- Write and balance chemical equations.
- 6- Understand the relation between formula and the structure of compounds.

- 7- Describe the principles of chemical bonding, bond polarity and molecular dipoles.
- 8- Describe the properties of the main group elements.
- 9- Predict the electronic structure of atoms and ions from quantum theory.
- 10- Write "Lewis dot" structures for covalent molecules including lone pairs and formal charge
- 11- Describe resonance in molecules
- 12- Understand the gaseous state, principal gas laws and gas stoichiometry.
- 13- Understand the concept of chemical equilibrium, equilibrium constant and define factors that affect equilibrium.
- 14- Understand the ionic equilibrium and application for acids, bases and sparingly soluble salt
- 15- Classification and naming of organic compounds and describe bonding in organic molecules with single, double and triple bonds in terms of  $\sigma$  and  $\pi$  bonds.
- 16- Describe the general structure of proteins and nucleic acids as natural polymer

### Text book :

Chemistry, by Chang, 9th. ed., 2007, McGraw-Hill.

Chemistry, by Steven S. Zumdahl, 6th ed., Houghton Mifflin College Div.

### Supplementary references :

Chemistry, by Mortimer, 6th ed., Wadsworth Inc.

### Time table for distributing theoretical/practical course contents :

Week	Lecture	Topic	Reading Assignment	What is due?
1	1	Introduction, SI-Units and their prefix	Ch.1 (p.16 – 17)	Prepare the book
	2	The Atomic Theory, The Structure of the Atom	Ch.2 (p. 42 – 49)	
	3	Atomic Number, Mass Number, and Isotopes	Ch.2 (p. 49 – 50)	Home work



Week	Lecture	Topic	Reading Assignment	What is due?
2	4	The Periodic Table, Molecules and Ions	Ch.2 (p. 51 – 54)	
	5	Chemical Formulas, Naming Compounds	Ch.2 (p. 55 – 64)	
	6			
3	7	Atomic Mass, Avogadro's Number and the Molar Mass of an Element, Molecular Mass	Ch.3 (p.80 – 87)	Home work
	8	Percent Composition of Compounds, Experimental Determination of Empirical and Molecular Formulas	Ch.3 (p. 88 – 94)	
	9	Chemical Reactions and Chemical Equations	Ch.3 (p. 94 – 99)	
4	10	Amounts of Reactants and Products	Ch.3 (p. 99 – 103)	
	11			
	12	Limiting Reagents, Reaction Yield	Ch.3 (103 – 107)	Home work
5	13	Concentration of Solutions (Molarity and dilution)	Ch.4 (p. 147 – 151)	
	14	Substances That Exist as Gases, Pressure of a Gas	Ch.5 (p. 174 – 178)	
	15	The Gas Laws, The Ideal Gas Equations,	Ch.5 (p. 179 – 190)	Home work
6	16	Dalton's Law of Partial Pressures	196 – 201)	
	17	From Classical Physics to Quantum Theory	Ch.7 (p. 276 – 279)	
	18	Bohr's Theory of the Hydrogen Atom, The Dual Nature of the Electron	Ch.7 (p. 282 – 291)	

Week	Lecture	Topic	Reading Assignment	What is due?
7	19	Quantum Numbers, Atomic Orbitals	Ch.7 (p. 294 – 300)	
	20	Electron Configurations, The Building-Up Principle	Ch.7	
	21		(p. 300 – 310)	
8	22	Periodic Classification of the Elements	Ch.8 (p.326 – 330)	Home work
	23	Periodic Variation in Physical Properties	Ch.8 (p.330 – 335)	
	24	Ionization Energy, Electron Affinity	Ch.8 (p.337 – 343)	
9	25	Lewis Dot Symbols, The Ionic Bond	Ch.9 (p.366 – 369)	
	26	The Covalent Bond, Electronegativity, Writing Lewis Structures, Formal Charge and Lewis Structures	Ch.9	
	27		(p. 374 – 386)	
10	28	The Concept of Resonance, Exceptions to the Octet Rule	Ch.9 (p. 386 – 392)	
	29	The Concept of Equilibrium and the Equilibrium Constant, Writing Equilibrium Constant Expressions	Ch.14	Home work
	30		(p.616 – 630)	



Week	Lecture	Topic	Reading Assignment	What is due?
11	31	The Relationship Between Chemical Kinetics and Chemical Equilibrium, What Does the Equilibrium Constant Tell Us?	Ch.14 (p.630 – 637)	
	32	Factors That Affect Chemical Equilibrium	Ch.14 (p.638 – 644)	
	33	The Acid-Base Properties of Water, pH—A Measure of Acidity, Weak Acids and Acid Ionization Constants	Ch.15 (p.661 – 666 670 – 677)	Home work
12	34	The Common Ion Effect, Buffer Solutions,	Ch.16 (p.714 – 723)	
	35	Solubility Equilibria	Ch.16 (p.735 – 742)	
	36	Hybridization of Atomic Orbitals (Organic) ( $sp^3$ , $sp^2$ , $sp$ )	Ch.10 (p.428 – 432)	
13	37	Classes of Organic Compounds, Aliphatic Hydrocarbons (alkane, cycloalkanes, alkenes, alkynes)	Ch.24 (p.1026 – 1030) (1033 – 1037)	Home work
	38	Aromatic Hydrocarbons (nomenclature), Chemistry of the Functional Groups (Functional groups only)	(p.1039 – 1040) (1047)	
	39	Proteins, Nucleic Acids	Ch.25 (p.1067 – 1078)	