



## UNIVERSITI TEKNOLOGI MARA

### CHM160: PRINCIPLES OF GENERAL CHEMISTRY

<b>Course Name (English)</b>	PRINCIPLES OF GENERAL CHEMISTRY <b>APPROVED</b>
<b>Course Code</b>	CHM160
<b>MQF Credit</b>	3
<b>Course Description</b>	This is an introductory course to provide students a firm foundation in general chemistry. The course covers measurement in scientific study, stoichiometry of formulas and equations, gases, atomic structure, periodic table, chemical bonding, redox reaction and chemical equilibria.
<b>Transferable Skills</b>	Demonstrate ability to identify and articulate self skills, knowledge and understanding confidently and in a variety of contexts
<b>Teaching Methodologies</b>	Lectures, Lab Work, Tutorial
<b>CLO</b>	<p>CLO1 State, write and explain the concepts, laws, trends and theories in measurement in scientific study, stoichiometry of formulas and equations, gases, atomic structure, periodic table, chemical bonding, redox reaction and chemical equilibria.</p> <p>CLO2 Relate and discuss verbally, visually (diagrams &amp; graphs) and algebraically the concepts, laws and theories in measurement in scientific study, stoichiometry of formulas and equation, gases, atomic structure, periodic table, chemical bonding, redox reaction and chemical equilibria.</p> <p>CLO3 Verify, assess &amp; employ the concepts, laws and theories in stoichiometry of formulas and equations, gases, atomic structure, periodic trends, chemical bonding and chemical equilibria to solve qualitative and quantitative problems.</p> <p>CLO4 Observe, plan, conduct and write scientific report in experiments concerning areas of stoichiometry of formulas and equations, gases, chemical bonding, redox reactions and chemical equilibrium.</p>
<b>Pre-Requisite Courses</b>	No course recommendations
<b>Topics</b>	
<b>1. Units of Measurement</b> 1.1) S.I Unit of Mass, Length, Time, Temperature, Amount of Substance, Electrical Current and Luminous Intensity. 1.2) Conversion of S.I units. 1.3) Significant Figures and Scientific Notation.	
<b>2. Elements, Compounds, Chemical Equations and Calculations</b> 2.1) Definitions of Atom, Ion, Molecule, Compound, Atomic Mass, Molecular Mass, Formula Mass and Equivalent Weight. 2.2) Symbol, Chemical Formula and Naming of Element, Molecules and Compounds. 2.3) Avogadro's number, Mole Concepts, Calculation of Mass to Mole Conversions. 2.4) Calculation of Composition of Compounds, Empirical and Molecular Formula. 2.5) Balancing of Chemical Equations. 2.6) Stoichiometric calculation and Limiting Reactants 2.7) Preparation and dilution stock solution, determination of its concentration. 2.8) Calculating involving solution (titrimetric analysis), acids and bases, and molarity of a solution.	

**3. The Gaseous State**

- 3.1) Substances that exist as gases and pressure of a gas.
- 3.2) The Ideal Gas Law: (Boyle's law), (Charles's law and Gay-Lussac's law), (Avogadro's law)
- 3.3) Density calculations and molar mass determination of gaseous substance.
- 3.4) Stoichiometry involving gases.
- 3.5) Dalton's Law of Partial Pressure
- 3.6) Graham's Law of Effusion and Diffusion
- 3.7) Deviation from ideal gas behaviour (Van der Waals equation)

**4. The Electronic Structure of Atoms and Periodic Table**

- 4.1) Electron, Proton, Neutron, Atomic Number, Mass Number and Isotope.
- 4.2) Introduction to Hydrogen Emission Spectrum, Bohr's Theory.
- 4.3) Quantum numbers n, l, m, s. Pauli's Principle, Hund's Rule, and Aufbau's Principles
- 4.4) Electronic Configuration of Atom and Ion
- 4.5) Importance of atomic number in the classification of elements.
- 4.6) Periodic and group of elements (atomic and ionic radii), (electronegativity).

**5. Chemical Bonds**

- 5.1) Definition of the Chemical Bond, Valence Electrons, Noble Gases and Octet Stability.
- 5.2) Lewis Structure: Ionic and covalent bonds, and examples of structures of simple molecules.
- 5.3) Valence-Shell Electron Pair repulsion (VSEPR) Theory and Molecular Shape
- 5.4) General characteristics of covalent compounds.
- 5.5) Basic concept and examples of Dative Covalent Bond, Hydrogen Bond and Van der Waals Forces

**6. Oxidation and Reduction Reactions**

- 6.1) Determination of Oxidation Number of Elements In Compounds.
- 6.2) Definition and Examples of Agents of Oxidation and Reduction.
- 6.3) Balancing Redox Equations in Acidic Medium.

**7. Introduction to Chemical Equilibrium**

- 7.1)  $K_c$  and  $K_p$
- 7.2) Factor affecting  $K_c$  and  $K_p$ . Simple calculations of  $K_c$  and  $K_p$ .
- 7.3) Le Chatelier's Principle: Effect of Temperature, Pressure, Concentration and Catalyst on Chemical Equation

Assessment Breakdown	%
Continuous Assessment	50.00%
Final Assessment	50.00%

Details of Continuous Assessment	Assessment Type	Assessment Description	% of Total Mark	CLO
	Lab Exercise	Lab 1 - 8.	10%	CLO1 , CLO2 , CLO3 , CLO4
	Quiz	Chapter 1 & 2	3%	CLO1 , CLO2 , CLO3
	Quiz	chapter 5,6 & 7	3%	CLO1 , CLO2 , CLO3
	Quiz	chapter 3 & 4	4%	CLO1 , CLO2 , CLO3
	Test	chapter 1 & 2	10%	CLO1 , CLO2 , CLO3
	Test	chapter 3 & 4	10%	CLO1 , CLO2 , CLO3
	Test	chapter 5,6 & 7	10%	CLO1 , CLO2 , CLO3

Reading List	Recommended Text	<ul style="list-style-type: none"> <li>Brady, J. E. and Senese, F., <i>Chemistry: Matter and Its Changes</i>, 5th Edition Ed., John Wiley and Sons</li> </ul>
	Reference Book Resources	<ul style="list-style-type: none"> <li>Chang, R., <i>General Chemistry: The Essential Concept</i>, 3rd Edition Ed., Mc Graw—Hill</li> <li>Chang, R 2007, <i>Chemistry</i>, 9th Edition Ed., McGraw-Hill</li> </ul>
Article/Paper List	This Course does not have any article/paper resources	
Other References	This Course does not have any other resources	