



## UNIVERSITI TEKNOLOGI MARA

### CHM138: BASIC CHEMISTRY

<b>Course Name (English)</b>	BASIC CHEMISTRY <b>APPROVED</b>
<b>Course Code</b>	CHM138
<b>MQF Credit</b>	3
<b>Course Description</b>	This is a basic chemistry course aimed to provide foundation in physical, organic, and inorganic chemistry. The topics covered include introduction to safety, safety awareness, MSDS and occupational safety and health act, mole concepts, reactions of acids and bases, atomic structure, periodic table, chemical bonding and redox reactions.
<b>Transferable Skills</b>	Fundamental knowledge of basic chemistry
<b>Teaching Methodologies</b>	Lectures, Lab Work, Tutorial
<b>CLO</b>	<p>CLO1 Relate the concept and solve quantitative problems associated with scientific measurement, stoichiometry of formulas and equations, acids and bases, atomic structure, chemical bonding and redox reactions.</p> <p>CLO2 Explain the concepts, laws and theories of measurement in scientific study, stoichiometry of formulas and equations, acids and bases, atomic structure, periodic table, chemical bonding, redox reactions and organic chemistry.</p> <p>CLO3 Construct the laboratory report in experiments concerning areas of basic laboratory techniques, empirical formula, limiting reagent, preparation of solution, titration of acid-base, redox reaction and geometry shape of covalent molecules by following the laboratory manual and given format.</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.	
<b>2. Elements, compounds, chemical equations and calculations.</b> 2.1) Definitions of atom, ion, molecule and compound. 2.2) Symbol, chemical formula and naming of element, molecules and compounds. 2.3) Mass relationship of atom and concept of mol: atomic mass, molecular mass, formula mass, Avogadro's number, number of mol, number of atoms, number of ions and number of molecules. 2.4) Definition and calculation of composition of compounds, empirical formula and molecular formula. 2.5) Writing and balancing chemical equations. 2.6) Stoichiometric calculations: Limiting reactant, amounts of reactants and products and concept of percent yield.	
<b>3. Concepts of acids-bases neutralization</b> 3.1) Electrolytes and non-electrolytes, weak and strong electrolytes. 3.2) Definition of acids and bases by Arrhenius, Bronsted- Lowry and Lewis. 3.3) Definition and properties of strong acids, weak acids, strong bases and weak bases. 3.4) Calculation involving concentration and molarity, pH and pOH, and dilution. 3.5) Titration of acids-bases: theory, volumetric calculation and titration curve.	

<p><b>4. Structure of the atom</b></p> <p>4.1) Definition and calculation of electron, proton, neutron, atomic number, mass number and isotope.</p> <p>4.2) Properties of light involving calculation of wavelength, frequency, energy and change in energy.</p> <p>4.3) Introduction to Bohr's theory.</p> <p>4.4) Quantum numbers: description and relationship of Principle, Angular, momentum, Magnetic and Electron spin quantum numbers.</p> <p>4.5) Arrangement of electrons: Pauli's Principle, Hund's Rule and Aufbau's principle.</p> <p>4.6) Electronic configuration of atom and ion: spdf notation and orbital diagram.</p>
<p><b>5. Periodic table</b></p> <p>5.1) Importance of atomic number in the classification of elements.</p> <p>5.2) Periodic trends</p> <p>5.3) Atomic and ionic radii</p> <p>5.4) Electronegativity</p> <p>5.5) Metallic character</p> <p>5.6) 1st ionization energy</p> <p>5.7) Electron affinity</p>
<p><b>6. Chemical Bonds</b></p> <p>6.1) Definition of the chemical bond, valence electrons, noble gases and octet stability.</p> <p>6.2) Lewis Structure: Ionic and covalent bonds, examples of structures of simple molecules and calculation of formal charge.</p> <p>6.3) Lewis Structure: Determination of electron bonding, non electron bonding, electron pair, molecular geometry of simple compounds using VSEPR theory (i.e. linear, trigonal planar, trigonal pyramidal, angular and tetrahedral)</p> <p>6.4) General characteristics of covalent compounds.</p> <p>6.5) Basic concept and examples of dative covalent bond, hydrogen bond, Van der Waals forces.</p>
<p><b>7. Oxidation and reduction (Redox) reactions</b></p> <p>7.1) Definition of oxidation and reduction.</p> <p>7.2) Determination of oxidation number of elements in compounds.</p> <p>7.3) Writing and balancing Redox equations in acidic and basic solution.</p> <p>7.4) Definition and examples of agents of oxidation and reduction.</p>
<p><b>8. Introduction to Organic Chemistry (hydrocarbons only)</b></p> <p>8.1) Types of hydrocarbons (alkanes, alkenes, alkynes)</p> <p>8.2) Nomenclature (IUPAC) of straight chain, branch and cyclic hydrocarbons</p> <p>8.3) Structural isomerism of alkane, alkene and alkyne</p> <p>8.4) cis and trans of alkene</p>

Assessment Breakdown	%
Continuous Assessment	100.00%

Details of Continuous Assessment	Assessment Type	Assessment Description	% of Total Mark	CLO
	Final Test	Online final assessment	40%	CLO1
	Lab Exercise	Laboratory work	15%	CLO3
	Online Quiz	Online Quiz	15%	CLO2
	Test	Online Test	30%	CLO1

Reading List	Reference Book Resources	<ul style="list-style-type: none"> <li>• Steven S. Zumdahl, Donald J. DeCoste 2015, <i>Basic Chemistry</i>, 8th Ed., University of Illinois</li> <li>• P.W Atkins and J.D Paula 2014, <i>Atkin's Physical Chemistry</i>, 10th Ed., Oxford University Press, New York</li> <li>• Darrell D. Ebbing, Steven D. Gammon 2016, <i>General Chemistry</i>, 11th Ed.</li> <li>• Martin S. Silberberg 2015, <i>Chemistry: The molecular Nature of Matter and Change</i>, 7th Ed., Mc Graw Hills New York</li> <li>• Ralph H. Petrucci, William S. Harwood, Geoff E. Herring, Jeffrey Madura 2017, <i>General Chemistry: Principles and Modern Applications</i>, 11th Ed., Prentice Hall</li> </ul>
Article/Paper List	This Course does not have any article/paper resources	
Other References	This Course does not have any other resources	