

CHEMISTRY

DMCU 1233

SEMESTER I

SESSION 2021/2022

1.0 OBJECTIVES

The objective of this course is to develop students so that they will be able to recognize various relevant chemistry principles involved in engineering and be able to solve chemistry related problem by applying the relevant chemical principles for mechanical and manufacturing engineering problems

2.0 LEARNING OUTCOMES

Upon completion of this course, the student should be able to:

- LO1 **Describe (C1)** and **Explain (C2)** fundamental of chemistry principle.
- LO2 **Solve (C3)** and **Analyze (C4)** various engineering problems using relevant chemistry principles.
- LO3 **Demonstrate (P1 – P4)** chemistry principles through laboratory experiment.

3.0 SYNOPSIS

This course will discuss about the concepts in Chemistry: The Study of Change; Atoms, Molecules and Ions; Chemical Reaction; Structure of Atoms; The Periodic Table; Chemical Bonding; Properties of Matter; and Thermochemistry.

4.0 REFERENCES

- a. Chang, Raymond (2013). "Chemistry". 12th Ed. McGraw Hill. USA.
- b. N. J. Tro (2009). "Introductory Chemistry". 3rd Ed. Pearson Education International.
- c. Petrucci, R. H. and Hill J. W. (2002). "General Chemistry: An Integrated Approach". Prentice Hall.
- d. Halimatun Hamdan *et al.* (2001). "Kimia Asas Sains dan Kejuruteraan". Johor Bahru.

5.0 COURSE IMPLEMENTATIONS

- a. Lecture (Online) – 2 hours per week for 13 weeks (Total = 26 hours)
- b. Tutorial (Online) – 3 hours per week for 3 weeks (Total = 9 hours)
- c. Laboratory (Online) – 3 hours per week for 5 weeks (Total = 15 hours)

There are 5 laboratory sessions throughout this course. The laboratory session covers topics:

Lab 1: Usage and Calibrate of Lab Glassware Equipment

Lab 2: Density of Liquid and Solid

Lab 3: Preparation and Standardization of Solution

Lab 4: Vinegar Analysis

Lab 5: Boyle's Law

6.0 COURSE INSTRUCTIONS

Attendance is compulsory for lectures/tutorials/laboratories and should be more than 80% of the total contact hours. Students must wear shoes during laboratories sessions. The lecturer/lab assistant has the authority to ban the students from attending laboratories sessions in the case of failure to wear safety shoes. There will be no replacement for laboratories session unless a valid medical certificate (MC) is presented.

7.0 COURSE EVALUATIONS

COURSE WORK	CRITERIA	PERCENTAGE (%)
Lab Report	5 Experiments (3 hours/Experiment)	40
Quiz	2 Quizzes (15 minutes/Quiz)	10
Mid Semester Test	1 Test (1.5 hours/Test)	10
Final Exam	2.5 hours	40
TOTAL		100

8.0 COURSE CONTENT

Week	Section	Contents	Remarks
Week 1 04/10/2021 - 08/10/2021			
Week 2 11/10/2021 - 15/10/2021	Briefing	Introduction <ul style="list-style-type: none"> Syllabus Coursework Assessment 	
Week 3 18/10/2021 - 22/10/2021 Week 4 25/10/2021 - 29/10/2021	Chapter 1	Chapter 1: Chemistry The Study of Change <ul style="list-style-type: none"> Introduction Classifications of matter Physical & chemical properties of matter Measurement (SI Units, mass & weight, volume, density, temperature scales) Handling numbers (Scientific notation, significant figures) Factor label method of solving problems 	
Week 5 01/11/2021 - 05/11/2021	Chapter 2	Chapter 2: Atom, Molecules and Ions <ul style="list-style-type: none"> The structure of the atom Atomic number, mass number and isotopes, molecules and ions Chemical formulas Naming compounds (Ionic compound, molecular compound, acids and bases, and organic compounds) 	Quiz 1 (Chapter 1 - 2)

<p>Week 6</p> <p>08/11/2021 - 12/11/2021</p> <p>Week 7</p> <p>15/11/2021 - 19/11/2021</p>	<p>Chapter 3</p>	<p>Chapter 3: Chemical Reaction</p> <ul style="list-style-type: none"> • Atomic mass, molar mass of an element and molecular • Avogadro's number • Percent composition of compounds • Empirical and molecular formulas • Chemical reactions and chemical equation • Amount of reactants and products • Limiting reagents and reaction yield • Reaction in aqueous solution, concentration of solution • Gravimetric analysis, acid-base titrations 	<p>Tutorial 1 (Chapter 1 - 3) (Week 7)</p>
<p>Week 8</p> <p>20/11/2021 - 23/11/2021</p>		<p>MID SEMESTER BREAK</p>	
<p>Week 9</p> <p>29/11/2021 - 03/12/2021</p> <p>Week 10</p> <p>06/12/2021 - 10/12/2021</p>	<p>Chapter 4</p>	<p>Chapter 4: Structure of Atoms and Periodic Table</p> <ul style="list-style-type: none"> • Model of the atom, quantum numbers • Atomic orbital, electron configuration and building up principle (Aufbau's, Hund's, Pauli's) • Periodic table • Periodic classification of the elements • Electron configurations of ions and transition Metal • Trends in physical and chemical properties such as atomic radii, effective nuclear charge, ionization energies electron affinities and electronegativity 	<p>Lab 1 (Week 9)</p> <p>Mid Semester Test (Chapter 1 - 3)</p> <p>Lab 2 (Week 10)</p>
<p>Week 11</p> <p>13/12/2021 - 17/12/2021</p>	<p>Chapter 5</p>	<p>Chapter 5: Chemical Bonding</p> <ul style="list-style-type: none"> • Ionic bonding, covalent bonding • Electronegativity and polarity, molecular geometry • Intermolecular forces and effect of polarisation (Dipole dipole forces, Ion dipole forces, Dispersion Forces, Hydrogen Bond) 	<p>Tutorial 2 (Chapter 4 - 5) (Week 11)</p> <p>Quiz 2 (Chapter 4 - 5)</p>

Week 12 20/12/2021 - 24/12/2021 Week 13 27/12/2021 - 31/12/2021	Chapter 6	Chapter 6: Properties of Matter <ul style="list-style-type: none"> • Three states of matter, phase changes • The gas laws (Boyle's, Charles' & Guy Lussac's, Avogadro's, Ideal gas equation) • Gas stoichiometry • Liquids properties (Surface tension, cohesion, adhesion, viscosity) • Solids (Crystalline and amorphous solid), unit cell (cubic cells) • Characterization of materials (SEM, Nitrogen adsorption analysis, XRD) 	Lab 3 (Week 12) Lab 4 (Week 13)
Week 14 03/01/2022 - 07/01/2022	Chapter 7	Chapter 7: Thermochemistry <ul style="list-style-type: none"> • Energy in chemical reaction, system and surrounding • Exothermic and endothermic process, enthalpy • Thermochemistry equation 	Lab 5 (Week 14)
Week 15 10/01/2022 - 12/01/2022	Chapter 7	Chapter 7: Thermochemistry <ul style="list-style-type: none"> • Calorimetric, heat capacity, specific heat capacity • Standard enthalpy of formation, standard enthalpy of reaction • Hess Law 	Tutorial 3 (Chapter 6 - 7) (Week 15)
Week 16 12/01/2022 - 16/01/2022		REVISION WEEK	
Week 17-18 17/01/2022 - 30/01/2022		EXAMINATION WEEK	

9.0 SUBJECT EVALUATION REPORT FROM PREVIOUS SEMESTER

COURSE	SEMESTER	SUGGESTION	ACTION TAKEN

10.0 COURSE STAFFS

a. Lecture & Laboratory Sessions

Lecturer	Lecture	Lab & Tutorial
Imran Syakir Bin Mohamad ☎: 019.507.5710 ✉: imran@utem.edu.my http://imsymo.blogspot.com/p/kimia.html	S1 & S2 S3 & S4	S1, S4
Dr. Mohd Haizal Bin Mohd Husin ☎: 012.618.1447 ✉: haizal@utem.edu.my	S1 & S2 S3 & S4	S1
Nurul Hanim Binti Razak ☎: 019.337.2751 ✉: nurulhanim@utem.edu.my		S2, S3, S4

b. Laboratory Staff

Adybah Atyqa Shahrina Binti Aimee Shahrin
☎: 011.2673.6277
✉: adybah@utem.edu.my