Teaching Plan

UNIVERSITI TEKNIKAL MALAYSIA MELAKA
FACULTY OF MECHANICAL TECHNOLOGY AND ENGINEERING

CHEMISTRY

DMKC 1033	SEMESTER I	SESSION 2023/2024

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

At the end of the course, students should be able to:

LO1 Describe and explain the fundamentals of chemistry principle.
LO2 Solve and analyze various engineering problems using relevant chemistry principles.
LO3 Demonstrate chemistry principles through laboratory experiment.

3.0 SYNOPSIS

This course will discuss 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. Jason Overby & Raymond Chang. 2022, *Chemistry*, 14th Ed., McGraw Hill, USA.
b. N. J. Tro., 2018, "*Introductory Chemistry*". 6th Ed. Pearson Education International.
c. Zumdahl & DeCoste, 2019, "Introductory Chemistry: A Foundation". 9th Ed. Cengage.
d. Halimaton Hamdan *et al*. (2001). "*Kimia Asas Sains dan Kejuruteraan*". Johor Bahru.

5.0 COURSE IMPLEMENTATIONS

a. Lecture – 2 hours per week for 13 weeks (Total = 26 hours)
b. Tutorial – 2 hours per week for 3 weeks (Total = 6 hours)
c. Laboratory – 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 Calibration 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

No	Learning Outcome	Program Outcome	Assessment Method	Knowledge Profile (DK)	Complex Problem Solving (DP)	Complex Problem Solving (EA)	Mark Code	Percentage (%)
1	1	1	KUIZ 1	1	1		KZ-1	5
2	2	2	KUIZ 2	1	1		KZ-2	5
3	1	1	MID TERM-Question 1	1	1		MT-1	5
4	2	2	MID TERM-Question 2	1	1		MT-2	5
5	3	4	LAB REPORT	1	5		LR-1 LR-2 LR-3 LR-4 LR-5	25
6	3	4	LAB TEST	1	5		LBT-1	15
7	1	1	PEPERIKSAAN AKHIR-Question 1	1	1		PA-1	10
8	1	1	PEPERIKSAAN AKHIR-Question 2	1	1		PA-2	10
9	2	2	PEPERIKSAAN AKHIR-Question 3	1	1		PA-3	10
10	2	2	PEPERIKSAAN AKHIR-Question 4 @ Question 5	1	1		PA-4 @ PA-5	10
TOTAL								**100**

DP1 depth of knowledge required
DP5 extent of applicable codes
DK1 natural sciences

8.0 COURSE CONTENT

Week	Section	Contents	Remarks
Week 1 09/10/2023 - 13/10/2023	**Briefing**	**Introduction** • Syllabus • Coursework • Assessment	
Week 2 16/10/2023 - 20/10/2023 **Week 3** 23/10/2023 - 27/10/2023	**Chapter 1**	**Chapter 1: Chemistry The Study of Change** • 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	**Lab 1 (Week 2)** **Lab 2 (Week 3)**
Week 4 30/10/2023 - 03/11/2023 **Week 5** 06/11/2023 - 10/11/2023	**Chapter 2**	**Chapter 2: Atom, Molecules and Ions** • 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)	**Lab 3 (Week 4)** **Quiz 1 (Chapter 1 - 2)** **Lab 4 (Week 5)**

Week 6 13/11/2023 - 17/11/2023 **Week 7** 20/11/2023 - 24/11/2023	**Chapter 3**	**Chapter 3: Chemical Reaction** • Atomic mass, mole and molar mass • 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	**Lab Test (Week 6)** *Deepavali* **Tutorial 1 (Chapter 1- 3) (Week 7)**
Week 8 25/11/2023 - 03/12/2023		**MID SEMESTER BREAK**	
Week 9 04/12/2023 - 08/12/2023 **Week 10** 11/12/2023 - 15/12/2023	**Chapter 4**	**Chapter 4: Structure of Atoms and Periodic Table** • 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	**Mid Semester Test (Chapter 1 - 3)** **Lab 5 (Week 10)**
Week 11 18/12/2023 - 22/12/2023	**Chapter 5**	**Chapter 5: Chemical Bonding** • 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)	**Tutorial 2 (Chapter 4 - 5) (Week 11)**

Week 12 25/12/2023 - 29/12/2023 **Week 13** 01/01/2024 - 05/01/2024	**Chapter 6**	**Chapter 6: Properties of Matter** • 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)	*Christmas Day* **Quiz 2 (Chapter 4 - 5)** *New Year 2023*
Week 14 08/01/2024 - 12/01/2024 **Week 15** 15/01/2024 - 19/01/2024	**Chapter 7**	**Chapter 7: Thermochemistry** • Energy in chemical reaction, system and surrounding • Exothermic and endothermic process, enthalpy • Thermochemistry equation • 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 20/01/2024 - 28/01/2024		**REVISION WEEK**	
Week 17-18 29/01/2024 - 08/02/2024		**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
Dr. Nur Izyan Binti Zulkafli (Coordinator) : 010.921.6412 : nurizyan@utem.edu.my		S4
Ts. Dr. Nurul Hanim Binti Razak : 019.337.2751 : nurulhanim@utem.edu.my		S3
Imran Syakir Bin Mohamad : 019.507.5710 : imran@utem.edu.my http://imsymo.blogspot.com/p/kimia.html	S1, S2, S3 & S4	S1, S2

b. Laboratory Staff

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