Teaching Plan

UNIVERSITI TEKNIKAL MALAYSIA MELAKA
FACULTY OF MECHANICAL ENGINEERING

CHEMISTRY

DMCU 1233	SEMESTER I	SESSION 2018/2019

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. Halimaton Hamdan *et al*. (2001). "*Kimia Asas Sains dan Kejuruteraan*". Johor Bahru.

5.0 COURSE IMPLEMENTATIONS

a. Lectures – 2 hours per week for 14 weeks (Total = 28 hours)
b. Tutorials – 3 hours per week for 3 weeks (Total = 9 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 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 (%)**
Test	1 Test (1.5 hours/test)	20
Lab Report	5 Experiments (3 hours/Experiment)	30
Quizzes	2 Quizzes (15 minutes/quiz)	10
Final Exam	2.5 hours	40
TOTAL		**100**

8.0 COURSE CONTENT

Week	Section	Contents	Remarks
Week 1 03/09/2018 - 07/09/2018	**Introduction** **Chapter 1**	**Introduction** (a) Syllabus (b) Coursework (c) Assessment **Chapter 1: Chemistry The Study of Change** (a) Introduction (b) Classifications of matter (c) Physical & chemical properties of matter (d) Measurement (SI Units, mass & weight, volume, density, temperature scales) (e) Handling numbers (Scientific notation, significant figures) (f) Factor label method of solving problems	Lab Briefing & Guided Study
Week 2 10/09/2018 - 14/09/2018			*Birthday of DYMM SPB YDP Agong* *Awal Muharram*
Week 3 17/09/2018 - 21/09/2018	**Chapter 2**	**Chapter 2: Atom, Molecules and Ions** (a) The structure of the atom (b) Atomic number, mass number and isotopes, molecules and ions (c) Chemical formulas (d) Naming compounds (Ionic compound, molecular compound, acids and bases, and organic compounds)	*Malaysia Day*
Week 4 24/09/2018 - 28/09/2018	**Chapter 3**	**Chapter 3: Chemical Reaction** (a) Atomic mass, molar mass of an element and molecular (b) Avogadro's number (c) Percent composition of compounds (d) Empirical and molecular formulas (e) Chemical reactions and chemical equation (f) Amount of reactants and products (g) Limiting reagents and reaction yield (h) Reaction in aqueous solution, concentration of solution (i) Gravimetric analysis, acid-base titrations	Lab 1 **Quiz 1 (Chapter 1-2)**
Week 5 01/10/2018 - 05/10/2018			Lab 2

Week 6 08/10/2018 - 12/10/2018	**Chapter 4**	**Chapter 4: Structure of Atoms and Periodic Table** (a) Model of the atom, quantum numbers (b) Atomic orbital, electron configuration and building up principle (Aufbau's, Hund's, Pauli's) (c) Periodic table (d) Periodic classification of the elements (e) Electron configurations of ions and transition Metal (f) Trends in physical and chemical properties such as atomic radii, ionization energies electron affinities and electronegativity	*Birthday of TYT Yang Di-Pertua Negeri Melaka*
Week 7 15/10/2018 - 19/10/2018			Tutorial 1
Week 8 22/10/2018 - 26/10/2018	**Chapter 5**	**Chapter 5: Chemical Bonding** (a) Ionic bonding, covalent bonding (b) Electronegativity and polarity, molecular geometry (c) Intermolecular forces and effect of polarisation (Dipole dipole forces, Ion dipole forces, Dispersion Forces, Hydrogen Bond)	Lab 3 **Test (Chapter 1- 3)**
Week 9 29/10/2018 - 02/11/2018			Lab 4
Week 10 05/11/2018 - 09/11/2018		**MID SEMESTER BREAK**	*Deepavali*
Week 11 12/11/2018 - 16/11/2018	**Chapter 6**	**Chapter 6: Properties of Matter** (a) Three states of matter, phase changes (b) The gas laws (Boyle's, Charles' & Guy Lussac's, Avogadro's, Ideal gas equation) (c) Gas stoichiometry (d) Liquids properties (Surface tension, cohesion, adhesion, viscosity)	Tutorial 2
Week 12 19/11/2018 - 23/11/2018			*Prophet Muhammad's Birthday*

Week 13 26/11/2018 - 30/11/2018	**Chapter 6**	**Chapter 6: Properties of Matter** (e) Solids (Crystalline and amorphous solid), unit cell (cubic cells) (f) Characterization of materials	**Quiz 2 (Chapter 5)**
Week 14 31/12/2018 - 07/12/2018	**Chapter 7**	**Chapter 7: Thermochemistry** (a) Energy in chemical reaction, system and surrounding (b) Exothermic and endothermic process, enthalpy (c) Thermochemistry equation (d) Calorimetric, heat capacity, specific heat capacity (e) Standard enthalpy of formation, standard enthalpy of reaction (f) Hess Law	Lab 5
Week 15 10/12/2018 - 14/12/2018			Tutorial 3
Week 16 17/12/2018 - 26/12/2018		**REVISION WEEK**	*Christmas Day*
Week 17-18 27/12/2018 - 09/01/2019		**EXAMINATION WEEK**	*New Year 2019*

9.0 SUBJECT EVALUATION REPORT FROM PREVIOUS SEMESTER

COURSE	SEMESTER	SUGGESTION	ACTION TAKEN

10.0 COURSE STAFFS

a. Lecture & Laboratory Sessions

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b. Laboratory Staff

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