**UNIVERSITI TEKNOLOGI MARA**

**CHM141: CHEMISTRY**

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| **Course Name (English)** | CHEMISTRY APPROVED |
| **Course Code** | CHM141 |
| **MQF Credit** | 3 |
| **Course Description** | This introductory course in basic chemistry includes fundamental concepts like atomic structures, general features in a periodic table and the various types of chemical bonds. This course also gives a brief introduction on the types of crystal structures and the general properties of the first series of transition elements. Besides the basic concepts, problem solving skills will be taught in topics like chemical stoichiometry, thermochemistry, electrochemistry, acids and bases. |
| **Transferable Skills** | Fundamental knowledge of basic chemistry. |
| **Teaching Methodologies** | Lectures, Practical Classes, Tutorial |
| **CLO** | CLO1 Apply the fundamental concepts of chemistry to study the composition, structures, properties and change of matter.<br>CLO2 Respond to laboratory procedures to perform the experiments in the laboratory sessions.<br>CLO3 Demonstrate teamwork skills in completing the experiments. |
| **Pre-Requisite Courses** | No course recommendations |

| **Topics** |
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| **1. Atoms and Molecules**<br>1.1) Symbols of element, atomic mass, molecule mass.<br>1.2) Mols and Avogadro's Number.<br>1.3) Chemical Formula's (empirical formula, molecular formula).<br>1.4) Moles for solutions (Concentration).<br>1.5) Chemical equations, limiting reagents and calculations. |
| **2. Structure of Atoms and Periodic Table**<br>2.1) Particles and subatomic particles.<br>2.2) Atomic Number, Mass Number, Isotopes.<br>2.3) Quantum Mechanics and Electron Configurations.<br>2.4) Periodic Table.<br>2.5) Periodic Variation in Physical Properties. |
| **3. Chemical Bonding**<br>3.1) Primary Chemical Bonding.<br>3.2) Lewis Structure.<br>3.3) Exception of Octet Rules.<br>3.4) Comparison of ionic compounds and covalent compounds.<br>3.5) Molecular geometry and polyatomic ions.<br>3.6) Secondary Chemical Bonding.<br>3.7) Variation in Melting point across the third-period elements. |
| **4. Thermochemistry**<br>4.1) Enthalpy of reactions.<br>4.2) Calorimetry.<br>4.3) Standard Enthalpy of formation and reaction.<br>4.4) Hess's Law.<br>4.5) Born-Haber Cycles. |

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| **5. Electrochemistry**<br>5.1) Oxidation numbers and calculations.<br>5.2) Oxidation-reduction reactions and balancing redox reactions.<br>5.3) Standard Electrode Potentials.<br>5.4) Galvanic cells and calculation of e.m.f. cells.<br>5.5) Spontaneity of redox reactions.<br>5.6) Corrosion. |
| **6. Crystal**<br>6.1) Types of crystal structures.<br>6.2) Lattice and unit cell.<br>6.3) Metallic crystal structures: bcc, fcc, hcp.<br>6.4) Ionic structures: CsCl , NaCl structures.<br>6.5) Simple Molecular/ covalent solids.<br>6.6) Macromolecular -graphite and diamond. |
| **7. Acids and Bases**<br>7.1) General properties of acids, bases, metal oxides and nonmetal oxides.<br>7.2) Neutralization reactions.<br>7.3) The Strengths of acids and bases.<br>7.4) pH and calculations.<br>7.5) Acid-Base Titration's and Indicators. |
| **8. Transition Elements**<br>8.1) Electron configurations (first series).<br>8.2) Properties of the transition metals.<br>8.3) Chemistry of Iron. |

| Assessment Breakdown | % |
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| Continuous Assessment | 100.00% |

**Details of Continuous Assessment**

| Assessment Type | Assessment Description | % of Total Mark | CLO |
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| Assignment | Written assignment contains all chapters in this course | 40% | CLO1 |
| Lab Exercise | Observation on individual laboratory skill and team work. | 5% | CLO3 |
| Test | Test 1 (week 7) & Test 2 (week 13) | 40% | CLO1 |
| Written Report | Experiment 1 (week 3), experiment 2 (week 8) & experiment 3 (week 13) | 15% | CLO2 |

**Reading List**

**Recommended Text**

- **Zumdahl, S. S. & Donald, J. D. 2015, *Basic Chemistry*, 8th. Ed., Houghton Mifflin Company New York**
- **Marina Mokhtar et. al. 2009, *Basic Chemistry for Engineering Students*, University Publication Centre (UPENA), UiTM Shah Alam [ISBN: 978-967-305-1]**

**Reference Book Resources**

- **Raymond Chang & Kenneth Goldsby 2016, *Chemistry*, 12th. Ed., McGraw - Hill**
- **Steven S. Zumdahl, ?Susan A. Zumdahl Mary Finch. 2013, *Chemistry*, 9th. Ed., Mary Finch**
- **Darrell Ebbing, ?Steven D. Gammon 2016, *General Chemistry*, 11th. Ed., Mary Finch**
- **Morris Hein, Susan Arena 2011, *Introduction to Chemistry*, 13th. Ed., Wiley**
- **John E. McMurry, Robert C. Fay, Jill Kirsten Robinson 2015, *Chemistry*, 7th. Ed., Pearson**

**Article/Paper List**: This Course does not have any article/paper resources

**Other References**: This Course does not have any other resources