**University of Management & Technology**

**Department of Chemistry**

**Course Code: CH-101**

**Course Title:** **Principle ofChemistry-I**

**Program: BS (CH/AMET)**

**Course Outline**

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| **Schedule** | Tue/Thu (3:30 pm-4:45 pm) | **Pre-requisite** | | Pre-Chemistry/ F.Sc. | |
| **Course Coordinators** | Shah Muhammad Haroon | **Contact** | | muhammad.haroon@umt.edu.pk | |
| **Course**  **Description** | In today’s society chemistry is greatly involved in the world of engineering. Whether it is aerospace, electrical, mechanical, environmental, energy or other [engineering fields](http://www.exampleessays.com/essay_search/engineering_fields.html), the makeup of substances is always a key factor which must be known. The more chemistry an engineer understands, the more beneficial it is.The curriculum is designed to prepare the undergraduate for work in the highly diverse chemistry profession. All practical [fields](http://www.exampleessays.com/essay_search/engineering_fields.html) have unique bonds with the chemistry. So this course provides an introduction to basic undergraduate chemistry and covers the concepts such as the periodic table, mole, stoichiometry, properties of matter & solutions, reactions in aqueous media, periodicity, structure of compounds and bonding theories. The course is taught using a problem-solving approach. | | | | |
| **Expected**  **Outcomes** | In future, global problems and issues will require an in-depth understanding of chemistry to have a global solution. Upon completion of this course, students will be able to understand the structure and property relationships of different materials; they will be ready to meet the challenges and opportunities of creating products especially nanomaterials and processes, controlling corrosion & oxidation, manipulating complex systems, and managing technical operations in industries. | | | | |
| **Text &Reference Book** | Chemistry ,7th edition Chemistry, 12th Edition  John McMurry, Robert C.Fay, Jill K robinson Chang&Goldsby  Pearson Education, 2015McGraw Hill Education, 2016 | | | | |
| **Assignment**  **& Projects** | Problems and applications will be assigned at regular intervals as an assignment.  Marks will be deducted for late submission. | | **Quizzes** | | All quizzes will be announced.  No make-ups will be offered for missed quizzes. |
| **Mid Term Examination** | A 60-minutes exam will cover all the material covered during the first 14lectures. | | **Final**  **Examination** | | A 120-minutes exam will cover all the material covered during the semester. |
| **Attendance**  **Policy** | Students missing more than 20% of the lectures will receive an “F” grade in the course. | | | | |
| **Grading**  **Policy** | Assignments: 5%  Quizzes:15%  Class Participation Activities: 10 %  Midterm:25%  Final:45% | | | | |

Principles of Chemistry-I(CH-101)

**Lecture Plan**

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| **Week** | **Lecture#** | **TOPICS** | **CH** | **SECTIONS** |
| 1 | 1 | Scientific Method, Experimentation and Measurement of Mas and Length, | 1 | 1-4 |
| 1 | 2 | Measurement ofTemperature, Derived Units  Volume,Density and Energy | 1 | 5-8 |
| 2 | 3 | Accuracy , Precision, Significant Figures, Rounding Numbers and Unit Conversion | 1 | 9 – 11 |
| 2 | 4 | Elements and the Periodic Table, Properties of Elements, Atomic Theory Conservation of Mass and Law of Definite Proportion | 2 | 1-4 |
| 3 | 5 | The Law of Multiple Proportions, Atomic Structure, Electrons, Protons, Neutrons and Atomic Numbers | 2 | 5-8 |
| 3 | 6 | Atomic Weights and the Mole, Mixtures and Chemical Compounds, Molecules, Ions and Ionic Bonds and Naming Chemical Compounds | 2 | 9-12 |
| 4 | 7 | Representing Chemistry on DifferentLevels and Balancing Chemical Equations | 3 | 1,2 |
| 4 | 8 | Stoichiometry and Yields of Chemical Reactions | 3 | 3,4 |
| 5 | 9 | Limiting Reactant, Percent Composition and Empirical  Formulas | 3 | 5,6 |
| 5 | 10 | Determining Empirical Formulas, Elemental Analysis, Determining Molecular Weights and Mass Spectrometry | 3 | 7,8 |
| 6 | 11 | Molarity, Dilution of Concentrated Solution and Electrolytes in Aqueous Solution | 4 | 1-3 |
| 6 | 12 | Types of Chemical Reactions inAqueous Solution, Net Ionic Equations, Precipitation Reactions and Solubility  Guidelines | 4 | 4-6 |
| 7 | 13 | Acids, Bases, and Neutralization  Reactions, Solution Stoichiometry. Titration | 4 | 7-9 |
| 7 | 14 | Redox Reactions, Identification and Activity Series of the Elements | 4 | 10-12 |
| 8 | 15 | Redox Titrations and Applications of Redox Reactions | 4 | 13,14 |
| 8 | 16 | **Midterm Exam** | | |

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| **Week** | **Lecture#** | **TOPICS** | **CH** | **SECTIONS** |
| 9 | 17 | Radiant Energy, Electromagnetic Spectrum, Photoelectric Effect, Line Spectra and Bohr Atomic Model | 5 | 1-4 |
| 9 | 18 | de Broglie’s Hypothesis, Heisenberg’s Uncertainty Principle, Orbitals ,Quantum Numbers and Shape of Orbitals | 5 | 5-8 |
| 10 | 19 | Pauli Exclusion Principle, Orbital Energy Levels and Electron Configurations of Multi Electron Atoms | 5 | 9-11 |
| 10 | 20 | Anomalous Electron Configurations, Periodic Table and PeriodicProperties: Atomic Radii | 5 | 12-14 |
| 11 | 21 | Electron Configurations of Ions and Ionic Radii | 6 | 1,2 |
| 11 | 22 | Ionization Energy , Higher Ionization Energies and Electron Affinity | 6 | 3-5 |
| 12 | 23 | The Octet Rule, Ionic Bonds and the Formation ofIonicSolids and their Lattice Energies | 6 | 6-8 |
| 12 | 24 | Covalent Bonding and its Strength, Polar Covalent Bonds and Electronegativity | 7 | 1-3 |
| 13 | 25 | Comparison of Ionic and Covalent Compounds, The Octet Rule, Drawing Electron-Dot Structures of Covalent compounds and Radical | 7 | 4-6 |
| 13 | 26 | Electron-Dot Structures of CompoundsContaining Only Hydrogen andSecond-Row Elements, Resonance and Formal Charge Calculation | 7 | 7-10 |
| 14 | 27 | Applications of Chemistry in Engineering | -- | -- |
| 14 | 28 | Applications of Chemistry in Chemical Industry | -- | -- |
| 15 | 29 | Applications of Chemistry in Medicine and Industry | -- | -- |
| 15 | 30 | Applications of Chemistry in Aviation and Transportation | -- | -- |
| 16 | 31 | Revision | -- | -- |
| 16 | 32 | Revision | -- | -- |
| **Final Examination** | | | | |