Course (Unit) Title	**General Chemistry**
Course (Unit) Code	CHE101G2
Credit Value	02 (30 hours of lectures and tutorials)
Objective/s	• Describe basic knowledge in electronic structure of atoms • Illustrate chemical bonding in molecules • Outline the concepts of nuclear chemistry • Define the fundamentals of titrimetry
Intended Learning Outcomes	• Interpret structure of atom • State wave-particle duality of electron • Illustrate shapes of s, p and d orbitals • Explain periodic trends based on electronic configurations • Recall the concepts of nuclear chemistry • Construct molecular structure using Lewis model and VSEPR rules • Explain the covalent bonding using valence bond theory and molecular orbital theory • Describe the concepts of polarization and types of secondary interactions • Explain the concepts used in titrimetry
Contents	**Structure of Atoms** • Development of atomic structure: electromagnetic radiation, atomic spectra of hydrogen, Bohr model • Dual behavior of matter: black body radiation, Compton effect, photoelectric effect, wave particle duality, de Broglie equation, Heisenberg uncertainty principle; • Quantum theory: wave function, introduction to ψ and ψ^2, quantum numbers, shapes of atomic orbitals, contour map electron density diagrams • Polyelectronic atoms: penetration and shielding, effective nuclear charge (Slater rules), Pauli exclusion principle, building up principle, Hunds rule • Periodic trends in atomic properties: atomic and ionic radii, electron affinity and ionization energies **Nuclear Chemistry** • Nuclei and isotopes, radioactivity, nuclear stability, binding energy, radioactive decay law, decay schemes, detection of radioactivity • Fission and fusion reactions, applications of radioactivity

	Bonding in Molecules • Classification of chemical bonds: Lewis dot structure, electronegativity, polarity and dipole moment, application of Lewis theory to construct molecular structure, the octet rule, resonance, prediction of shapes of molecules using VSEPR rules • Valence bond theory: nature of σ and π bonding in molecules, hybridization of atomic orbitals • Molecular orbital theory: bonding in homonuclear diatomics, s, p orbital mixing, bond strength and bond order, heteronuclear diatomics • Intermolecular forces: metallic bond, van der Waals forces, hydrogen bond • Bonding in solids: metals, alloys, conductors and semiconductors **Introduction to Titrimetry** • Fundamentals of acids and bases: Arrhenius theory, Bronsted-Lowry's theory, Lewis theory, acid base equilibria in aqueous solution, pH • Acid-base reactions: primary and secondary standards, standard solutions, titration curves, equivalent points, end point detections, indicators, pH curves, buffers, solubility product principle, common ion effect and their applications to the precipitation and separation of common metallic ions
Teaching and Learning Methods / Activities	Lectures, Tutorials and Assignments
Evaluation	In course assessment 30% End of course examination 70%
Recommended References	• Atkins, P.; Rourke, T. O. J.; Weller, M. and Armstrong, F., *Inorganic Chemistry*, 5th Edition, Oxford University Press, 2010. • Atkins, P. and Jones, L., *Chemical Principles*, 4th Edition, W. H. Freeman and Company, 2008. • Miessler, G. L.; Fischer, P. J. and Tarr, D. A., *Inorganic Chemistry*, 5th Edition, Pearson Education, 2014.