COURSE OUTLINE CHM201

STAFF	AREAS TO COVER
Dr. Ayeni	**Atomic Theory (From Classical Theory to Quantum Theory) and Molecular Orbital Theory** Experiments associated to the discovery of electrons, protons, nucleus and neutrons (such as Rutherford's experiments, JJ Thompson's experiments, Milliken oil drop experiment and the determination of charge-to-mass ratio (e/m), radioactive particles). Moseley's Law, Limitation to classical theory. Birth of quantum theory: Max Plank – interaction with light and matter, Albert Einstein – relationship between matter and energy, Bohr's theory and it limitation. De Broglie- dual nature of electron, Heinsberg's – Uncertainty principle, Schrøndinger's equation and derivation of quantum numbers. Quantum numbers and the significance of each of the numbers and their theoretical determinations. Molecular orbital theory – electronic configurations and deviations, molecular energy profiles. Homonuclear and heteronuclear combinations, bond order, possibility of existence and non-existence of molecular compounds and ions. Concept of effective nuclear charge, factors affecting the magnitude of shielding effect, calculation of σ and Z* using Slater's rule.
Dr. Doherty	**Periodicity of Chemical Properties** Periodic Law, arrangement of electrons on the periodic table, determination of probable location of elements on the periodic table Trends and factors affecting the following on the periodic table: atomic size, atomic volume, atomic and ionic radii, ionization potential, electron affinity, electronegativity, polarizing power and polarizability and Fajan's rule. **Chemical Bonding III** Need for bonding and conditions which they occur. Definitions and types of on bonding (Intramolecular- ionic, covalent [single, double, triple bonds], dative bond, metallic bond; intermolecular – Van der Waals forces, dipole-dipole interactions, hydrogen bonding) their occurrence with relevant examples; polarity of these bonds. Comparison between the types of bonds and their properties using adequate examples. Properties of ionic and covalent compounds with suitable illustrations; factors favouring the formation of ionic and covalent bonds, structure of ionic and

	covalent compounds. Peculiarity of metallic bonds and properties attributed to it as displayed in their malleability and ductility.
Dr. George	**Introduction to Symmetry** Using VESPR theory to predict shape of molecules. Symmetry elements and operations - identity operation (E), rotation operation (C_n), reflection (σ), inversion (i), improper rotation (S_n) and other symmetry operations. Point group – groups of low and high symmetry (with rules guiding their assignment) Order of the groups **Introduction to Coordination Compounds II** Definition of complexes, ligand, spectator ions, primary and secondary valences Denticity of ligands (mono-, bi-, tri-, poly- and ambidentate) Nomenclature of coordination compounds Properties of coordination compounds Werner's coordination theory Coordination number and its significance in geometry of the coordinated compounds with appropriate examples and structure Isomerism of coordination complexes: cis-, trans-, fac- and mer- isomers Introduction of CFT, spectrochemical series, magnetic properties, spin Lability and inertness of complexes and factors that affect lability
Dr. Aiyelabola	**Acids, Bases, Salts and Ions in Aqueous Solutions** Brønsted and Lewis acids and bases- difference between Brønsted and Lewis acids and bases with examples; Definition- acid-base properties of water. Definition with examples of Hard and Soft acids and bases; conjugated acid-base pair as described in a given chemical equation and conditions under which they occur. **Inorganic Application of Standard Reduction Potentials** Redox reactions – half cell reactions Electrode potential and factors affecting the magnitude of electrode potential Standard hydrogen electrode, standard electrode potential, Electromotive force (e.m.f.), ΔG, E°, K Electrode potential as related to the formation of coordinated compounds: (a) The effect of complex formation or precipitation on M^{2+}/M^0 reduction potential (b) Modifying the relative stabilities of different oxidation state of a metal (c) Stabilizing species against disproportionation (d) Potential diagrams (calculations must be involved in the examples given)