

## Allied Course for other Programs

## Department of Chemistry

## Syllabus

## For Students Admitted from A.Y. 2016-2017 &amp; Onwards

16UBCDA05	Chemistry for Biologists	4 Hrs./Wk	4 credits
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**Unit 1. Fundamental Analytical Chemistry–I****(08 Hrs.)****(1) Modes of Concentration:**

Introduction, Theory of Solution, Solvent, Solute, Primary & Secondary standard solutions, Determination of Molecular weight and eq. weight, Different modes of concentration - Normality, Molarity, Molality, Mole fraction, % W/W, % W/V, % V/V, ppm, ppb, ppt, Numerical.

**(2) Acid- Base & Buffers**

- Introduction, Definitions – Acids and Bases
- Strong and weak electrolytes
- Degree of ionization
- Ionic product of water
- Ionization of weak acid and weak base
- pH scale
- Common ion effect
- Buffers & types of Buffers
- Mechanism of Buffers
- Determination of pH of buffer by Henderson equation
- Buffer capacity

**Unit 2. Fundamental Organic Chemistry–I****(08 Hrs.)**

- Organic compounds: Classification and Functional Groups, Nomenclature, hybridization, shapes of molecules, influence of hybridization on bond properties.
- Electronic displacement: Study of various effects: Inductive effect, Electromeric effect,
- Resonance & Mesomeric effect and Hyper conjugation and their applications
- **Reaction Intermediates:** Hemolytic and heterolytic bond fission, Curly arrow rules, formal charges, Nucleophile, Electrophile, Nucleophilicity & Basicity, Strength of organic acids and bases: Comparative study with emphasis on factors affecting pK values.

- Types of reaction intermediates -Carbocation, Carbanion, Carbon free radical, Carbene,
- Introduction to types of organic reactions and their mechanism: Addition, Elimination (including E<sup>1</sup>, E<sup>2</sup>) and Substitution reactions (including SN<sup>1</sup>, SN<sup>2</sup>).

### Unit 3. Fundamental Inorganic Chemistry–II

(06 Hrs.)

#### Chemical Bonding

- Types of Bonds: Covalent, Covalent Co-ordinate, Ionic, Metallic, Vander Waal's Forces
- Hybridization:
  - sp – BeCl<sub>2</sub>
  - sP<sup>2</sup> – BF<sub>3</sub>
  - sp<sup>3</sup> – CH<sub>4</sub>
  - sp<sup>3</sup>d – PCl<sub>5</sub>
  - sp<sup>3</sup>d<sup>2</sup>- SF<sub>6</sub>
- Sidgwick Powell rule
- Valence bond theory and its limitations
- VSEPR theory

### Unit 4. Fundamental Physical Chemistry–II

(08 Hrs.)

#### Chemical Kinetics

- Introduction
- Reaction rate, Order and Molecularity of reaction
- Derivation, Characteristics, Half life time & Examples of
  - Zero order reaction
  - First order reaction
  - Second order reaction
- Method for determining the order of reaction. (I) Graphical method (II) Ostwald's isolation method (III) Method of half-life period (V) Integration method
- Energy of Activation and catalysis

#### Electro Chemistry

- Introduction,
- Reversible and Irreversible cell,
- Type of electrodes,
- Measurement of EMF of cells,
- Thermodynamics of electrode and cell potentials – Nernst equation,
- Standard electrode potential & measurement,
- Representation of electrochemical cell and cell reaction from single electrodes.

**Unit – 5. Applied Chemistry****(06 Hrs.)****Pharmaceutical Chemistry**

- Introduction to Pharmaceutical Chemistry and pharmacopeia.
- Impurities in Pharmaceuticals:
  - Sources of impurities,
  - tests for purity and Identity,
  - limit tests for iron, arsenic, lead, heavy metals, chloride, sulphate
- Pharmaceutical Aids:
  - Anti-oxidants,
  - Preservatives
  - Adsorbent
  - Diluents

<b>16UBCDA06</b>	<b>Chemistry for Biologists Practical</b>	<b>2 Hrs./Wk</b>	<b>1 credit</b>
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- Volumetric Analysis: (Acid- Base) : (03)
- Organic spotting : (05)
- Chemical Kinetics: Determination of order of reaction ( first order) : (01)
- Determination of order of reaction ( second order) : (01)