# OC S 515: CHEMISTRY OF BIOMOLECULES

**Course Outcome**

- Enable the students to learn about structure and functions of lipids, prostaglandins and thromboxanes.
- Enable the students to learn about structure and synthesis of Plant pigments and Antibiotics.
- To understand the importance and functions of enzymes in biological systems.

**UNIT-I** **[12 Hours]**

**Lipids:** Introduction, Classification and biological functions, Simple lipids (Oils and fats)- Introduction and properties, synthesis of mono, di and mixed glycerides. Fatty acids: Introduction, classification, essential fatty acids- ω-3 and ω-6 fatty acids; Oxidation of fatty acids analysis of oils and fats, Synthesis of oleic acid, recinoleic acid, linoleic acid and linolenic acid, total synthesis of fatty acids. Soaps and Synthetic detergents.

Phospholipids and spingolipids-Structure and biological importance.

**Prostaglandins:** Introduction, Nomenclature, Classification and Biological role of Prostaglandins, Structural elucidation and stereochemistry of $PGE_1$, $PGE_2$ and $PGE_3$. Total synthesis of $PGE_1$ , $PGE_2$ (Corey's method & Stork's synthesis) and $PGE_3$ (Up John's synthesis). Inhibition of prostaglandin synthesis.

**Thromboxanes:** Introduction, structure, synthesis and biological activities of thromboxanes (TXA and TXB).

**UNIT-II** **[12 Hours]**

**Plant Pigments/Porphyrins:** Occurrence, extraction, classification, chemical characterization and functions of anthocyanins, flavonoids, xanthophylls and porphyrins. Structure elucidation and synthesis of Kaempferol, Quercetin, Cyanidin, Genestein, Butein and Daidzein. Structrue elucidation, synthesis and biological importance of porphyrin skeleton, haemin and chlorophyll.

**Antibiotics:** Introduction, Classification, β-Lactum antibiotics, Structure and synthesis of Penicillin-G, Penicillin-V, Ampicillin, Amoxycillin and Chloramphenicol. Structure and biological importance of Cephalosporin, Tetracyclin and Strectomycin.

**UNIT-III** **[12 Hours]**

**Enzymes:** Introduction, nomenclature, classification with examples and their functions. The mechanistic role of the co-enzymes in the living systems-Thiamine pyrophosphate (TPP) in oxidative and non-oxidative decarboxylation of keto acids and formation of ketols; Pyridoxal phosphate in transamination, decarboxylation, dealdolization and elimination reactions of amino acids; Lipoic acid in the transfer of acyl group and oxidation reactions; Co-enzyme A in generation and ternsfer of acyl groups; Biotin in the addition of carboxyl groups to saturated carbon atoms and in transcarboxylation reactions; tetrahydrofolic acid in one carbon transfer reactions at all oxidation levels except that of $CO_2$; Nicotenamide and flavin coenzymes in biological oxidation-reduction reactions. Biogenesis of fatty acids, terpenoids (mono and sesquiterpenoids), steroids, amino acids, alkaloids.

**References**


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