

Course Code	Course Title	Teaching Load			Marks		Exam (hrs)		Credits
		L	T	P	Int.	Ext.	Int.	Ext.	
BP203T	Biochemistry	3	1	-	25	75	1	3	4

Scope: Biochemistry deals with complete understanding of the molecular levels of the chemical process associated with living cells. The scope of the subject is providing biochemical facts and the principles to understand metabolism of nutrient molecules in physiological and pathological conditions. It is also emphasizing on genetic organization of mammalian genome and hetero and autocatalytic functions of DNA.

Objectives: Upon completion of course student shall be able to

1. Understand the catalytic role of enzymes, importance of enzyme inhibitors in design of new drugs, therapeutic and diagnostic applications of enzymes.
2. Understand the metabolism of nutrient molecules in physiological and pathological conditions.
3. Understand the genetic organization of mammalian genome and functions of DNA in the synthesis of RNAs and proteins.

Module 01

08 Hours

Biomolecules

- Introduction, classification, chemical nature and biological role of carbohydrate, lipids, nucleic acids, amino acids and proteins.

Bioenergetics

- Concept of free energy, endergonic and exergonic reaction, Relationship between free energy, enthalpy and entropy; Redox potential.
- Energy rich compounds; classification; biological significances of ATP and cyclic AMP.

Module 02

10 Hours

Carbohydrate Metabolism

- Glycolysis – Pathway, energetics and significance.
- Citric acid cycle- Pathway, energetics and significance.
- HMP shunt and its significance; Glucose-6-Phosphate dehydrogenase (G6PD) deficiency.
- Glycogen metabolism Pathways and glycogen storage diseases (GSD).
- Gluconeogenesis- Pathway and its significance.
- Hormonal regulation of blood glucose level and Diabetes mellitus.

Biological Oxidation

- Electron transport chain (ETC) and its mechanism.
- Oxidative phosphorylation and its mechanism and substrate phosphorylation.
- Inhibitors ETC and oxidative phosphorylation/Uncouplers.

Module 03

10 Hours

Lipid Metabolism

- β -Oxidation of saturated fatty acid (Palmitic acid).
- Formation and utilization of ketone bodies; ketoacidosis.
- De novo synthesis of fatty acids (Palmitic acid).
- Biological significance of cholesterol and conversion of cholesterol into bile acids, steroid hormone and vitamin D.
- Disorders of lipid metabolism: Hypercholesterolemia, atherosclerosis, fatty liver and obesity.

Amino Acid Metabolism

- General reactions of amino acid metabolism: Transamination, deamination and decarboxylation, urea cycle and its disorders.
- Catabolism of phenylalanine and tyrosine and their metabolic disorders (Phenylketonuria, Albinism, alcaptonuria, tyrosinemia).
- Synthesis and significance of biological substances; 5-HT, melatonin, dopamine, noradrenaline, adrenaline.
- Catabolism of heme; hyperbilirubinemia and jaundice.

Module 04

10 Hours

Nucleic Acid Metabolism and Genetic Information Transfer

- Biosynthesis of purine and pyrimidine nucleotides.
- Catabolism of purine nucleotides and Hyperuricemia and Gout disease.
- Organization of mammalian genome.
- Structure of DNA and RNA and their functions DNA replication (semi conservative model).
- Transcription or RNA synthesis.
- Genetic code, Translation or Protein synthesis and inhibitors.

Module 05

07 hours

Enzymes

- Introduction, properties, nomenclature and IUB classification of enzymes.
- Enzyme kinetics (Michaelis plot, Line Weaver Burke plot) Enzyme inhibitors with examples.
- Regulation of enzymes: enzyme induction and repression, allosteric enzymes regulation.
- Therapeutic and diagnostic applications of enzymes and isoenzymes.
- Coenzymes –Structure and biochemical functions.

Recommended Books (Latest Editions)

1. Principles of Biochemistry by Lehninger.
2. Harper's Biochemistry by Robert K. Murry, Daryl K. Granner and Victor W. Rodwell.
3. Biochemistry by Stryer.

4. Biochemistry by D. Satyanarayan and U. Chakrapani.
5. Textbook of Biochemistry by Rama Rao.
6. Textbook of Biochemistry by Deb.
7. Outlines of Biochemistry by Conn and Stumpf.