

(B. Pharm)
(Semester - II)

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Course Code	BP203T
Course Title	Biochemistry - Theory

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 & autocatalytic functions of DNA.

Objectives:

Upon completion of course, student shell 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.

Course Learning Outcomes (CLO):

At the end of the course, students will be able to –

1. Understand the general principles of biochemistry.
2. Discuss the basic metabolic pathways and mechanisms in biological energy transduction.
3. Report the biochemical reactions and calculate the bioenergetics of energy yielding biochemical reactions.
4. Describe the structure and function of biomolecules and their roles in energy transduction.
5. Discuss the consequences of a variety of metabolic and genetic diseases.
6. Identify the enzyme catalyzed reactions in the body with its kinetics.

Syllabus:**Teaching hours: 45 Hours****UNIT I****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

UNIT II

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 & its mechanism and substrate level phosphorylation Inhibitors

ETC and oxidative phosphorylation/Uncouplers

UNIT III

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 & decarboxylation, urea cycle and its disorders

Catabolism of phenylalanine and tyrosine and their metabolic disorders (Phenylketonuria, Albinism, alkeptonuria, tyrosinemia)

Synthesis and significance of biological substances; 5-HT, melatonin, dopamine, noradrenaline, adrenaline

Catabolism of heme; hyperbilirubinemia and jaundice

UNIT IV

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

UNIT V

07 Hours

Enzymes and Vitamin:

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 including design of new drugs.
Coenzymes –Structure and biochemical functions.
Details of Vitamin.

Tutorials

Teaching hours: 15 Hours

Tutorials will be based on above syllabus.

Suggested Readings[^]: (Latest Editions)

1. Nelson, D. L., Lehninger, A. L., & Cox, M. M. *Lehninger principles of biochemistry*. Macmillan.
2. Murray, R. K., Granner, D. K., Mayes, P., & Rodwell, V. *Harper's illustrated biochemistry*. New York: McGraw-Hill.
3. Berg, J. M., Tymoczko, J. L., & Stryer, L. *Biochemistry*. New York: WH Freeman.
4. Satyanarayan, U. & Chakrapani, D. *Biochemistry*. India: Elsevier.
5. Rama Rao, A. V. S., & Devlin, T. M. *Textbook of Biochemistry: For Medical Students*. UBS publishers.
6. Deb, A. C., *Fundamentals of biochemistry*. New Central Book Agency (P) Limited.
7. Conn, E., & Stumpf, P. *Outlines of biochemistry*. John Wiley & Sons.
8. Gupta, R.C. & Bhargava, S. *Practical Biochemistry*. CBS Publishers & Distributors Pvt. Ltd
9. Mu, P., & Plummer, D. T. *Introduction to practical biochemistry*. Tata McGraw-Hill Education.
10. Rajagopal, G. & Ramakrishna S. *Practical Biochemistry for Medical Students*. orient blackswan
11. Varley, H. *Practical clinical biochemistry*. London: William Heine-mann Medical Books, Ltd.

L= Lecture, T= Tutorial, P= Practical, C= Credit

[^]this is not an exhaustive list
