

# 16BT201 BIOCHEMISTRY

Hours Per Week :

L	T	P	C
3	-	2	4



Source:  
[www.medipharmlab.com/](http://www.medipharmlab.com/)

## Course Description and Objectives:

This course provides various chemical processes associated with living cell machinery. In addition, it offers a clear-cut idea about various molecular mechanisms, metabolic pathways and biochemical processes regulating the production of energy for the functioning of cells. The objective of this course is to familiarize students on the complex structures of biomolecules, their synthesis, interaction and metabolism.

## Course Outcomes:

Upon completion of the course, the student will be able to

- CO1: Understand the structure and functions of biomolecules.
- CO2: Interpret biochemical pathways for carbohydrates and their bioenergetics.
- CO3: Classify structures of amino acids, protein and their metabolism.
- CO4: Evaluate the role of fatty acid synthesis and their metabolism.
- CO5: Depict the intermediary metabolism of biomolecules.
- CO6: Carry out qualitative and quantitative analysis of macromolecules.

## SKILLS:

- ✓ Identify biomolecules by colorimetric and biochemical assays.
- ✓ Quantify macromolecules using UV-VIS Spectrophotometer.
- ✓ Proficiency in paper, thin layer and gel chromatographic techniques.
- ✓ Operation of HPLC.

**ACTIVITIES:**

- Analyze bio-molecules in food samples.
- Estimate macromolecules in biological fluids.
- Model exercises on building structures of macromolecules.

**UNIT - 1****L-9**

**CARBOHYDRATES:** Structure and properties of mono-, di-, oligo- and polysaccharides, complex carbohydrates; Confirmation of pyranose and furanose ring, glycosidic bond; Structure and function of glycogen, starch, dextran, cellulose, glycoproteins, glycosaminoglycans and lectins.

**UNIT - 2****L-9**

**BIOENERGETICS AND METABOLISM OF CARBOHYDRATE:** Aerobic and anaerobic respiration-glycolysis, gluconeogenesis, glycogenolysis and gluconeogenesis; Entner–Doudoroff (ED) pathway; Pentose phosphate shunt and TCA cycle.

**UNIT - 3****L-9**

**METABOLISM OF AMINO ACIDS:** Amino acids - classifications, physico-chemical properties; Protein structure, folding and function; Nitrogen cycle; Nitrogen balance; Reductive amination; Transamination and urea cycle; Synthesis of amino acids - glutamate pathway, serine pathway and shikimate pathway.

**UNIT - 4****L-9**

**LIPIDS AND THEIR METABOLISM:** Classification, structure and roles of fatty acids; Synthesis and breakdown of fatty acid; Synthesis and metabolism of triglycerides; Cholesterol structure and function; Lipoproteins - classification and function.

**UNIT - 5****L-9**

**NUCLEIC ACIDS AND INTERMEDIARY METABOLISM:** Structure and properties of purines, pyrimidines, nucleosides and nucleotides; Biosynthesis and degradation of nucleic acids; Interconnection of pathways and metabolic regulation.

**LABORATORY EXPERIMENTS****LIST OF EXPERIMENTS**

Total hours: 30

1. Preparation of buffers and pH measurement.
2. Qualitative and quantitative tests for carbohydrates by 3,5-dinitro salicylic acid (DNS) method.
3. Qualitative and quantitative tests for amino acids.
4. Protein estimation by Biuret / Lowry / Bradford methods.
5. Separation of different macromolecules by paper and thin layer chromatography.
6. Extraction of lipids through solvents.
7. Analysis of cholesterol by Zak method.
8. Estimation of RNA by orcinol methods.
9. Separation of proteins by electrophoresis.

**TEXT BOOKS:**

1. A.L. Lehninger, O.L. Nelson and M.M. Cox , "Principles of Biochemistry", 3<sup>rd</sup> edition, CBS Publications, 2005.
2. J.L. Jain , "Fundamentals of Biochemistry ", 7<sup>th</sup> edition, S. Chand Publishers, 2009.

**REFERENCE BOOKS:**

1. L. Stryer, J.M. Berg and J.L. Tymoczko, "Biochemistry", 5<sup>th</sup> edition, WH Freeman and Co., 2002.
- 2.K. Mathews, K.E. Van Holde, K. G. A. Hern, "Biochemistry", 3<sup>rd</sup> edition, Pearson education, 2005.
3. K. Wilson and J. Walker, "Techniques of Practical Biochemistry", 5<sup>th</sup> edition, Cambridge University Press, 2000.