

**SEMESTER : 1<sup>st</sup>**

**MAJOR/MINOR COURSE**

**Subject: Clinical Biochemistry**

**TITLE: BIOMOLECULES- METABOLISM AND RELATED DISORDERS Code: BCB22C101**

**CREDIT: (4+2) THEORY: 04; PRACTICAL: 02**

**Contact Hours: 64(T) + 64 (L)**

*Course Objectives:*

- To acquaint the students with basic understanding of the structure and properties of macromolecules of living systems and their clinical importance.
- To enable the students to consolidate their focus on understanding various metabolic pathways crucial for the sustenance of living systems
- To provide students an opportunity to learn basic laboratory techniques.

*Learning outcomes: On completion of the course, the student should be:*

- Well versed with molecular and cellular foundations of life
- Able to comprehend the structure, function and biochemical properties and clinical significance of carbohydrates, proteins and lipids
- Able to prepare various laboratory solutions and independently identify various biomolecules in the laboratory

**UNIT I: Carbohydrates - Metabolism and associated disorders (16 Contact hours)**

General description of carbohydrates - Classification and Properties of carbohydrates (structural and optical) Glucose metabolism and its regulation – glycolysis, Krebs cycle, glycogen metabolism and gluconeogenesis and Pentose phosphate pathway. Disorders of carbohydrate metabolism – Glycogen storage disease (von Gierke's disease) and Diabetes Mellitus.

**UNIT II: Lipids – Metabolism and associated disorders (16 Contact hours)**

Nomenclature, basic structure and classification of fatty acids, triglycerides, cholesterol and phospholipids; Lipoproteins - general structure and their types; Lipid metabolism:  $\beta$ -oxidation, Biosynthesis of Fatty acids, Cholesterol metabolism. Disorders – Lipid storage disease, dyslipidaemia, Hypercholesterolemia and Atherosclerosis

**UNIT III: Proteins - Metabolism and associated disorders (16 Contact hours)**

Basic structure, classification and metabolism of clinically important amino acids- phenylalanine and tyrosine. Inherited errors of amino acid metabolism - Phenylketonuria, Alkaptonuria and Maple Syrup Syndrome. Proteins – overview and structure (Primary, Secondary and Tertiary).

**UNIT IV: Nucleic acids – Metabolism and associated disorders (16 Contact hours)**

Structure and properties of purines and pyrimidine bases, nucleoside and nucleotides, Structure of DNA and RNA, types of DNA(A, B, Z). Metabolism - Biosynthesis and degradation of purines and pyrimidines; Disorders of Purine/Pyrimidine metabolism - Lesch Nyhan Syndrome, ADA deficiency and Gout

**Laboratory Course (Practicals: 2 Credits) (64 Contact hours)**

- 1) Biochemical calculations – Molarity, Molality, Normality, percent solution
- 2) Preparation of standard Buffers and determination of pH of a solution by pH meter
- 3) Qualitative tests for Carbohydrates (Molisch's test, Fehling's test, Benedict's test, Barfoed's test, Osazone test)
- 5) Qualitative tests for Amino acids (Ninhydrin test)
- 8) Quantitative estimation of proteins (Lowry Method)

**Suggested Readings:**

1. Lehninger Principles of Biochemistry 4th Ed by David L. Nelson and Michael M. Cox, WH Freeman and Company.
2. Biochemistry and Molecular biology by William H. Elliott and Daphne C. Elliott. Oxford University Press.
3. Fundamentals of Biochemistry: Life at the Molecular Level 5th Ed. By Donald Voet, Judith G. Voet and Charlotte W. Pratt. Publisher: Wiley.
4. An Introduction to Practical Biochemistry by Plummer.
5. Practical Biochemistry by Bashir Ahmad Ganie

# Government Degree College Baramulla