

## Course contents for Biochemistry

1. **Faculty:** FLSB
2. **Course Code:** LSB501
3. **Course Title:** Biochemistry
4. **Number of Credits:** 5 (2L, 1T, 2P)
5. **Course objectives:**

This course is designed to show the origins of Biochemistry in the history of Chemistry, to learn important metabolic pathways and principles of enzyme assay, kinetic analysis of enzymatic reactions, factors influencing enzyme activity in vitro and in vivo, concepts of metabolic regulation at molecular, cellular and at organism level with selected examples and to appreciate metabolic studies in drug discovery, diagnostics in disease.

6. **Minimum prerequisites for taking this course, if any:** Prior exposure to UG level Chemistry, Biochemistry or Physiology.

7. **Course structure with units, if applicable:**

- a. **Chemical foundations of Biology:** Biomolecules-Structure, analysis and bioassays.
- b. **Metabolism:** Metabolism-discovery, concepts, methods of investigation and metabolic basis of health and disease.
- c. **Metabolic pathways:** catabolism and anabolism; selected examples of metabolic pathways from animal systems; catabolism of selected amino acids, sugars, fatty acids and nucleotides; biosynthesis of selected amino acids, fatty acids, nucleotides and carbohydrates; gluconeogenesis.
- d. **Metabolic regulation:** concepts, nature of enzymes, classification, mechanism of action, kinetics and energetics of enzyme catalyzed reactions; influence of temperature, substrate concentration, allosteric ligands, pH, post-translational modifications, Hormonal regulation and integration of mammalian metabolism.
- e. **Applications of metabolic studies:** Natural products as drugs; metabolic disorders and their diagnosis; enzymes as drug targets; principles of metabolic engineering; metabolism and energy production.

8. **Practicals:**

- a. Extraction and assay of an enzyme (Acid Phosphatase)
- b. Effect of substrate concentration and inhibitor on enzyme activity
- c. Preparation of SDS PAGE gel
- d. Determination of molecular weight of a given protein by SDS-PAGE
- e. Recombinant Protein Expression in E. coli (BL21) cells
- f. Preparation of Cell free lysate (Sonication)
- g. Affinity chromatography
- h. Measuring the purity of purified proteins on SDS-PAGE
- i. Measuring the concentration of purified proteins using BCA kit

**9. Suggested Readings:**

- a. Lehninger's Principles of Biochemistry by David Nelson et al (WH Freeman & Company) Latest edition.
- b. Biochemistry by Berg, Tymoczko and Stryer (WH Freeman & Company). Latest edition.
- c. Biochemistry by Campbell and Farrell, International edition (Brooks/Cole Cengage Learning)

**10. Evaluation:**

Theory:	Mid-semester Written Examination	: 40% Marks
	End-semester Written Examination	: 40% Marks
	Quiz / Assignment/Presentation (oral / poster)/other	: 20% Marks

