INDIAN INSTITUTE OF TECHNOLOGY KHARAGPUR

1. **Name of the Academic Unit:** Bioscience and Biotechnology

2. **Subject Name:** Biochemistry **L-T-P: 3-1-0** **Credits: 4**
3. **Pre-requisites:** Science of Living Systems
4. **Compulsory or Elective:** Compulsory for BSBT students
5. **Level of the subject:** UG
6. **Syllabus and reference books:**

Syllabus:

Biochemistry is the study of biological phenomena at the molecular level through the amalgamation of biological and chemical principles. Its aim is to make students understand the fundamental chemical principles that govern complex biological systems. It emphasizes the importance of a solid foundation in the natural sciences, including mathematics and physics. The focus areas include disciplines within biology and chemistry, ranging from cell biology and molecular biology to analytical chemistry and physical chemistry. The program seeks to graduate biochemists who are conversant in concepts ranging from biological evolution to quantum chemistry. Understanding the molecular logic of life and being able to participate in the acquisition of this knowledge is integral to liberal education. We also rely on those departmental courses to develop our students' cognitive and technical skills, skills that will make them scientifically literate and able to contribute to the discipline in their careers. The primary objectives of this course give students a solid foundation in biology and chemistry and help them to develop analytical and critical-thinking skills that allow independent exploration of biological phenomena through the scientific methods and also introduces students to modern methods of biochemical experimentation.

Reference Books:

1. Biochemistry by Jeremy M. Berg, LubertStryer, John Tymoczko , Gregory Gatto, Publisher: WH Freeman; 9th ed. ISBN-10: 1319114652

2. Lehninger Principles of Biochemistry: International Edition, By David L. Nelson, Michael Cox, WH Freeman; 7th ed.. ISBN-10: 9781319108243

3. Voet′s Principles of Biochemistry by Donald Voet, Judith G. Voet, Charlotte W. Pratt, John Wiley & Sons; 5th Edition ISBN-10: 1119451663

4. Textbook of Biochemistry with Clinical Correlationsby Thomas M. Devlin , Wiley-Liss; 7 edition, ISBN-10: 0470281731

7. Lecture-wise break-up:

Sl. No.	Topic	No. of lectures
1.	Structure and function of biomolecules: Amino acids, Carbohydrates, Lipids, Proteins and Nucleic acids; Protein structure, folding and function	12
2.	Enzymes and co-enzymes, Enzyme kinetics including its regulation and inhibition. Physiological functions of vitamins; minerals and, hormones and concept of signal transduction	6
3.	Glycolysis, Glycogenesis, Glycogenolysis, TCA cycle, Gluconeogenesis. Hormonal regulation of carbohydrate metabolism and clinical correlation of carbohydrate metabolism. Electron transport and oxidative phosphorylation	5
4.	Fatty acid metabolism through beta-oxidation of saturated and unsaturated fatty acids, fatty acid synthesis mechanisms, synthesis of cholesterol, Essential fatty acids in the form of arachidonic acid, DHA, EPA and omega 3,6,9 fatty acids	5
5.	Amino acid metabolism: ways of amino acid synthesis, amino acid pool and regulation of protein turnover. Transamination, deamination- oxidative and non-oxidative, desulfhydration. Ammonia assimilation	5
6.	Purine metabolism, synthesis through de novo and salvage pathways, synthesis of AMP and GMP, formation of di and tri phosphates and its regulation. Clinical correlation of purine synthesis inhibitors. Purine degradation and associated diseases and inhibitors used. Pyrimidine synthesis, production of TTP, UTP, CTP, their triphosphates and deoxynucleotide triphosphates. Pyrimidine catabolism and associated diseases.	5
7.	Tutorials and class tests	12
	Total number of hours	**50**