TEERTHANKER MAHAVEER UNIVERSITY

(Established under Govt. of U. P. Act No. 30, 2008)
Delhi Road, Moradabad (U.P.)

Ph.D. PROGRAMME

SYLLABUS FOR DISCIPLINE-SPECIFIC COURSE

MEDICAL LAB TECHNIQUES (BIOCHEMISTRY)

Course Code: PDS240109	**BIMOLECULAR SCIENCE**	**L**	**T**	**P**	**C**
		0	**0**	**0**	**4**
Objective:	Biochemistry aims to provide a foundational understanding of biomolecules, enzymes, metabolic pathways, and molecular interactions. It emphasizes analytical skills, experimental techniques, and real-world applications in medicine, biotechnology, and sustainability. Students develop critical thinking and problem-solving abilities while exploring biochemical research and its integration into biological and chemical sciences.				
Course Outcomes:					
CO 1:	Describing the structure, function, and metabolic pathways of biomolecules, including carbohydrates, proteins, lipids, nucleic acids, vitamins, and minerals.				
CO 2:	Applying knowledge of enzyme kinetics, coenzymes, and diagnostic enzymes to measure enzyme activity and interpret clinical data.				
CO 3:	Analyzing the mechanisms of DNA replication, transcription, translation, and repair, and evaluating molecular biology techniques such as PCR and gene cloning for research purposes.				
CO 4:	Assessing the regulation and mechanisms of hormone action and evaluating the roles of antigens, antibodies, and MHC molecules in immunity.				
CO 5:	Evaluating the experimental protocols for protein separation, chromatography, spectroscopy, and blotting techniques.				
Course Content:					
Unit 1:	**Biomolecules and Their Metabolism:** Structure and function of biomolecules (carbohydrates, proteins, lipids, nucleic acid, vitamins, and minerals); Carbohydrate metabolism, transamination and deamination, urea cycle, fatty acid synthesis, de novo and salvage synthesis, and metabolism of purines and pyrimidines.				
Unit 2:	**Clinical Enzymology:** Overview of enzymes, Enzyme kinetics, Factors affecting enzyme activity, Enzyme Inhibition, Isoenzymes, and diagnostic enzymes. Coenzyme: Classification, various types and functions, the structure of NAD+, NADP+, FAD and FMN, PPP. Units for measuring enzyme activity, and factors affecting enzyme level in serum/ plasma.				
Unit 3:	**Molecular Biology of cells:** Overview of DNA replication, transcription, Translation DNA				

	damage and repair mechanisms, Isolation and purification of nucleic acids; amplification of DNA using PCR, Basic Principles of Gene Cloning, and DNA Analysis.
Unit 4:	**Endocrinology:** Hormones, Classification of hormones, organs of endocrine system their secretion and function, regulation of hormone secretion, Mechanism of action. Innate and adaptive immunity, antigens, B and T cell epitopes, structure and function of antibody molecules, MHC molecules Organ Function Test: Liver function test; kidney function test; thyroidfunction test; cardiac function test; pancreas function test.
Unit 5:	Principle and methods of protein separation techniques, basic of chromatography-gel filtration, Ion exchange, affinity, HPLC, Electrophoresis- SDS-PAGE, Basic of Spectroscopy-UV-Vis, Fluorescence, NMR. Principle and applications of southern, northern and western blotting.
Textbooks:	1. Textbook of Biochemistry- 10th Edition D M Vasudevan, Sreekumari S, Kannan Vaidyanathan 2. Lehninger Principles of Biochemistry-8th Edition David L. Nelson, Michael M. Cox 3. Tietz Fundamentals of Clinical Chemistry and Molecular Diagnostics- *9th Edition* Nader Rifai 4. 4. Biochemistry" (2019) J.M. Berg, J.L. Tymoczko, G.J. Gatto and L. Stryer, pub. W.H. Freeman. 5. "Biochemistry" (2011) D. Voet and J.G. Voet, pub. Wiley.
Reference Books/ Additional Electronic Reference Material:	1. https://www.ncbi.nlm.nih.gov/guide/genetics-medicine/ 2. https://www.jove.com/education/3226/general-laboratory-techniques