



TEERTHANKER MAHAVEER UNIVERSITY

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

Delhi Road, Moradabad (U.P.)

PhD PROGRAMME

SYLLABUS FOR DISCIPLINE-SPECIFIC COURSE MEDICAL LAB TECHNIQUES (BIOCHEMISTRY)

Course Code: PDS240109	MEDICAL LABORATORY TECHNIQUES	L	T	P	C
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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:	<p>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; thyroid function test; cardiac function test; pancreas function test.</p>
Unit 5:	<p>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.</p>
Textbooks:	<ol style="list-style-type: none"> 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:	<ol style="list-style-type: none"> 1. https://www.ncbi.nlm.nih.gov/guide/genetics-medicine/ 2. https://www.jove.com/education/3226/general-laboratory-techniques