

Course Code	Course Title	L	T	P	C
BABIT302	Industrial Enzymology	3	1	0	4
Pre-requisite	BABIT101 --Biochemistry	Syllabus Version			
		1			
Course Objectives					
1. Understand enzyme nomenclature, catalytic and kinetic behavior 2. Demonstrate extraction, purification and formulation of enzymes 3. Explore the application of enzymes in various industries					
Course Outcomes					
1. Understand the chemical and biological features of enzyme reaction 2. Solve the kinetics and mechanism of enzyme action 3. Construct strategies in enzyme isolation and purification 4. Explain how enzymes are used in industrial processes 5. Design enzymes to suit specific industrial process					
Module:1	Enzyme Kinetics and Mechanisms	10 hours			
Introduction: Enzyme nature and its properties; Classification; Enzyme Kinetics Michaelis Menton and LB plot; Enzyme inhibitors and its types; Catalytic mechanisms: Proximity effect; Rate enhancement through transition state; Stabilization; Metal-ion catalysis; Covalent catalysis; Acid base catalysis with respective examples of enzymes for each mechanism					
Module:2	Extraction and Purification of Enzymes	6 hours			
Intracellular and extracellular enzymes; Isolation of enzymes from natural sources: Microbial, Plant and Animal origin; Strategies in enzyme isolation and purification; Assessment of purity of isolated enzymes; Enzyme assays using natural and synthetic substrates; Specific activity assessment.					
Module:3	Enzymes in Food Industry	7 hours			
Introduction to process involved in beer and wine production; Process involved in cheese manufacture; Enzymes in cheese manufacture; Enzyme modified cheese (EMC); Processing of whey, Process involved in fruit juice production; Enzymes in meat processing industry; Immobilized enzymes and their applications in food industry					
Module:4	Enzymes in Leather, Detergent paper and textile Industry	10 hours			
Introduction to leather processing steps and enzyme application in Curing, Soaking, Dehairing, Dewooling, Bating, Tanning and effluent treatment; Enzymes in detergent industry; Process and production of pulp for paper, Applications of enzymes for paper and pulp; Textile processing (cellulose, silk and wool): Use of enzymes in desizing, Scouring, Bleaching and polishing; Applications of					

cellulases, Pectinases, Hemicellulases, Lipases and catalases; Enzymatic treatment of textile effluents		
Module:5	Therapeutic and Diagnostic Applications of Enzymes & Enzyme Formulations and Regulations	10 hours
Enzyme as analytical, diagnostic and therapeutic agents; Use of enzyme coupled assays in the determination of metabolites like Glucose, Urea, Cholesterol; Isoenzymes in diagnosis - LDH, CK, ALP, ACP, ALT, AST, GGT; Therapeutic effect of enzymes: Asparaginase, Urokinase, Hyaluronidase, Streptokinase, Adenosine deaminase, Lactamase, Trypsin; Enzymes in sensors; Need for enzyme formulations; Basis of enzyme formulations; Modification of industrial enzyme function and stability by enzyme engineering approaches (directed evolution to semi-rational or rational design) - Case studies; Safety and regulatory aspects; Ethics in the use of enzymes in food products, Medical and dietary considerations; Evaluation of enzyme safety and toxicity.		
Total Lecture Hours:		43 hours
Tutorial Hours:		15 hours
Text Book(s)		
Jo Phillips, " Fundamentals of Enzymology ", ED TECH Press,UK, 1 st Edition, 2020 Pankaj Bhatt, " Industrial Applications of Microbial Enzymes ", Boca Raton,CRC Press, 1 st Edition, 2022		
Reference Books		
Selim Kermasha and Michael N A Eskin, " Enzymes: Novel Biotechnological Approaches for the Food Industry ", Academic Press, United States., 1 st Edition, 2020 Andreas Vogel and Oliver May, " Industrial enzyme application ", Wiley-VCH Verlag GmbH & Co. Germany., 1 st Edition, 2019 Hrudayanath Thatoi,Pradeep K Das Mohapatra, Sonali Mohapatra, Keshab C Mondal,, " Microbial Fermentation and Enzyme Technology ", CRC Press. Boca Raton, 1 st Edition, 2020		
Mode of Evaluation :Continuous Assessment Test, Digital Assignment, Quiz, Final Assessment Test, Seminar, Group Discussion, Presentaion		
Recommended by Board of Studies :		26-05-2025
Approved by Academic Council : No. 78		12-06-2025