

Course Code	Course Title	L	T	P	C
BABIT312	Food Process Engineering	3	1	0	4
Pre-requisite	BABIT101 - Biochemistry	Syllabus Version			
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Course Objectives					
1. Equip students with fundamental knowledge of food process engineering principles to understand and design efficient food processing system 2. Provide knowledge about the conventional processes for food.Develop students' ability to apply preservation and packaging technologies to enhance food quality, safety, and shelf life 3. Develop students' ability to apply preservation and packaging technologies to enhance food quality, safety, and shelf life Provide details about the modern food processing techniques. Prepare students to integrate automation and process control techniques to optimize food processing operations					
Course Outcomes					
1. Understand core principles in food process engineering including unit operations, mass and energy balance, heat and mass transfer 2. Analyze and design the efficient food processing system by application of fluid mechanics, separation process, heat, and mass transfer principles 3. Evaluate food preservation technologies and packaging systems to preserve food quality and extend shelf life 4. Understand automation and control in food processing by implementing sensors, robotics, and artificial intelligence 5. Understand food safety standards and quality assurance during food processing, packaging, and distribution					
Module:1	Introduction to Food Process Engineering and Principles	8 hours			
Definition and significance of unit operations; Common unit operations in food manufacturing; Basic Principles of Mass and Energy Balances; Physical Properties of Food Materials; Heat and Mass Transfer in Food Systems; Role of Process Engineering in Food Safety and Quality.					
Module:2	Heat and Mass Transfer in Food Processing	9 hours			
Thermal properties of food; Steady-state heat transfer in food systems by conduction, Convection, and radiation; transient heat transfer; Estimation of conductivity, and other thermal properties of foods; Molecular diffusion and Fick's Law; Steady-state diffusion; Diffusion through solids, Liquids; Mass transfer coefficients and Permeability.					

Module:3	Conventional Food Preservation Technologies	9 hours
Thermal, chemical, and biological preservation methods; Blanching, drying; freezing, canning, and membrane processing; Separation of solids from liquids and gas-liquid separations; Traditional and indigenous techniques; Application of separation processes in dairy, juice, and meat processing.		
Module:4	Emerging Food Preservation Technologies and Packaging	9 hours
Emerging non-thermal preservation methods; Role of biotechnology and nanotechnology in food preservation; Active and intelligent packaging: modified atmosphere packaging, vacuum packaging, and edible coatings; Sustainable packaging design with eco-friendly materials for preservation of foods.		
Module:5	Food Process Automation, Control, and Quality Assurance	8 hours
Precision, hygiene and efficiency of sensors, robotics, and artificial intelligence (AI) for process optimization and quality control; Automated systems in sorting, packaging, and quality inspection; Process control methods: PID controllers, model predictive control, and adaptive control HACCP system; Compliance with food safety standards and regulations.		
Module:6	Contemporary Topics	2 hours
Total Lecture Hours:		45 hours
Tutorial Hours:		15 hours
Text Book(s)		
Singh R.P., Heldman D.R., Erdogdu F., "Introduction to Food Engineering," Academic Press, USA, 6 th Edition, 2020		
Reference Books		
Romeo T. Toledo, "Fundamentals of Food Process Engineering", CBS Publisher & Distributors Pvt. Ltd, India, 4 th Edition, 2020 Charm SE, "Fundamentals of Food Engineering", MedTech, India, 4 th Edition, 2019		
Mode of Evaluation :Continuous Assessment Test, Digital Assignment, Quiz, Final Assessment Test, Seminar		
Recommended by Board of Studies :		26-05-2025
Approved by Academic Council : No. 78		12-06-2025