



Gyanmanjari
Innovative University

Course Syllabus
Gyanmanjari Institute of Technology
Semester-V

Subject: Food Biotechnology- BETFT15311

Type of course: Major

Prerequisite: Basic knowledge of Biotechnology and chemistry

Rationale: It bridges the gap between biotechnology and food science, fostering innovation in sustainable food production, quality assurance, and nutritional enhancement, essential for addressing global food security challenges.

Teaching Scheme			Credits	Examination Marks					Total Marks
CI	T	P	C	Theory Marks		Practical Marks		CA	
				ESE	MSE	V	P	ALA	
4	0	2	5	60	30	10	20	30	150

Legends: CI-Class Room Instructions; T – Tutorial; P - Practical; C – Credit; ESE - End Semester Examination; MSE-Mid Semester Examination; V-Viva; CA-Continuous Assessment; ALA- Active Learning Activities

Course Content:

Unit No.	Course content	Hrs.	% Weightage
1	Introduction: food biotechnology: definition, history, current situation, social perception General aspects of food technology and food industry. Quality attributes in food: sensory ,nutritional and safety properties. Food spoilage: physical, chemical and microbiological agents. Strategies for the control of spoilage agents.	10	20%



2	Fermentation in food industry: Starter cultures: classification, applications, market trends ,legal aspects. Fermented products: classification, characteristics, industrial production ,microorganisms involved and targets for starter improvement. Cheese: types, improvement of starters. Products obtained by alcoholic fermentation: alcoholic drinks .Production of ingredients and additive	15	30%
3	Enzymes in food industry: Enzymes in food science: friend and/or enemy. Properties of enzymes of special interest for food technologists. Use of enzymes in food processing: filtration aids, production of sweeteners. Biotechnological modification of enzymes involved in food processing: general strategies and examples.	10	20%
4	Genetically Modified Organisms for the production of foods with improved properties :Biotechnological modification of nutritional value of foods. Fundamentals of food flavor and its biotechnological modification. Food texture and structure and its biotechnological modification. Chemical basis of food color: modification through biotechnological strategies. Modification of starches for their use in food industry. Modification of proteins for the food scientist.	15	30%
5	Vitamins & minerals: occurrence, physiological function of vitamins and minerals. Introduction to human nutrition; Nutritive values of foods; Basal metabolic rate; Techniques for assessment of human nutrition, Dietary requirements and deficiency diseases of different nutrients.	10	20%

Continuous Assessment:

Sr. No.	Active Learning	Marks
1	Case Study on Food Spoilage and Preservation Techniques: . Students select a food item prone to spoilage (e.g., dairy, meat, or fruits) and design a preservation method combining physical, biological, and chemical techniques. They also analyze real-world examples of food	10



	borne illness outbreaks (e.g., <i>Salmonella</i> or <i>Clostridium</i>) and propose rapid identification methods for pathogens.	
2	Research and Presentation on GM Foods and Single-Cell Protein: Students research specific examples of genetically modified (GM) foods and single cell proteins (SCP), highlighting their production, advantages, and ethical considerations. They prepare a brief presentation with supporting data.	10
3	HACCP Plan for a Food Processing Scenario: Students develop a HACCP (Hazard Analysis and Critical Control Points) plan for a selected food processing scenario (e.g., dairy production, meat packaging). They identify critical control points, potential hazards, and prevention methods to ensure food safety and submit Detail plan at GMIU portal.	10

Suggested Specification table with Marks (Theory):60

Distribution of Theory Marks (Revised Bloom's Taxonomy)						
Level	Remembrance (R)	Understanding (U)	Application (A)	Analyze (N)	Evaluate (E)	Create (C)
Weightage	20%	30%	40%	10%	-	-

List of Practical

Sr. No.	Title	Hours
1.	Determination of moisture content in food samples	2
2.	pH and acidity determination of foods	2
3.	Isolation of microorganisms from food	4
4.	Total plate count (TPC) of food samples	4
5.	Pasteurization of milk	2
6.	DNA isolation from food samples	4
7.	Detection of coliforms by presumptive (Most Probable Number) from food sample.	4



8.	Probiotic culture study	4
9.	Thin layer chromatography for food colour/dye analysis in food sample.	2
10.	Study of food spoilage and preservation methods	2
Total		30

Course Outcome:

After learning the course, the students should be able to:	
CO1	Remember and explain the principles of food biotechnology and its applications in improving food nutrition, safety, and quality
CO2	Apply food safety standards and preservation techniques to real-world food processing challenges.
CO3	Recall key microorganisms and biotechnology concepts used in food processing and preservation.
CO4	Understand the legal and ethical aspects of food biotechnology in the context of food safety and quality assurance.
CO5	Analyze the effectiveness of fermentation processes and packaging techniques in food preservation.

Instructional Method:

- The course delivery method will depend upon the requirement of content and the need of students. The teacher in addition to the conventional teaching method by blackboard, may also use any of the tools such as demonstration, role play, Quiz, brainstorming, MOOCs etc.
- From the content, 10% of topics are suggested for flipped mode instruction.
- Students will use supplementary resources such as online videos, NPTEL/SWAYAM videos, e-courses, Virtual Laboratory
- The internal evaluation will be done based on the Active Learning Assignment



Reference Books:

- [1] Food Biotechnology, Vol 1 & 2; King RD & Cheetham PSJ; 1988, Elsevier App. Sci.
- [2] Food Biotechnology; Angold R, Buch G & Taggart J; 1989, Cambridge University Press.
- [3] Fermentation Biotechnology: Principles, Processes & Products; Ward OP; Open University press.
- [4] Food Biotechnology: Principles and Practices, S.C. Bhatia, Atlantic Publishers & Distributors.
- [5] Genetically Modified Foods: Basics, Applications, and Controversy, Salah E. O. Mahgoub, CRC Press.
- [6] Preservatives and Preservation Approaches in Food Products, M. N. Riaz, A. K. Chaudhary, CRC Press.

