GUJARAT TECHNOLOGICAL UNIVERSITY

Program Name: Bachelor of Vocation

Level: Under Graduate

Branch: Food Processing and Quality Control

Course / Subject Code: BV03009011

Course / Subject Name: Food Microbiology

w. e. f. Academic Year:	2024-25
Semester:	3
Category of the Course:	Core Courses

Prerequisite: Basic knowledge of biology, microbiology, and food science.

Rationale:	The course provides an understanding of microorganisms in food systems, their role in food spoilage, preservation, and fermentation. This knowledge is crucial for ensuring food safety and developing innovative food products. Students will acquire both theoretical and practical skills to analyze and control microbiological processes in the food industry.

Course Outcome:

After Completion of the Course, Student will able to:

No	Course Outcomes
01	Explain the role and types of microorganisms in food.
02	Analyze microbial spoilage and methods to control contamination in food.
03	Apply microbiological techniques to ensure food safety and quality.
04	Design and evaluate microbial processes for food preservation and fermentation.

Teaching and Examination Scheme:

Teaching Scheme (in Hours)			Total Credits L+T+ (PR/2)	Assessment Pattern and Marks				Total Marks
				Theory		Tutorial / Practical		
L	T	PR	C	ESE (E)	PA / CA (M)	PA/CA (I)	ESE (V)	
3	0	0	3	50	0	0	0	50

Course Content:

Unit No.	Content	No. of Hours	% of Weightage
1.	**Introduction to Food Microbiology** History and scope of food microbiology Types of microorganisms in food (bacteria, yeast, mold, and viruses) Factors influencing microbial growth in food	**10**	**20**

2.	**Food Spoilage and Contamination** Sources and types of food contamination Microbial spoilage in different food products (meat, dairy, cereals, vegetables) Foodborne illnesses and pathogens (Salmonella, Listeria, E. coli, etc.)	**8**	**20**
3.	**Methods of Food Preservation** Principles of food preservation Physical methods (heat, freezing, drying, irradiation) Chemical methods (preservatives) Biopreservation	**10**	**20**
4.	**Fermentation and Microbial Applications** Microorganisms in fermented foods (dairy, bakery, beverages) Probiotics and prebiotics Role of enzymes and microbes in food production	**9**	**20**
5.	**Food Safety and Quality Control** Microbial testing methods (HACCP, ISO 22000, PCR, ELISA) Legislation and regulatory frameworks in food microbiology Emerging trends in food microbiology	**8**	**20**
	Total	**45**	**100**

Suggested Specification Table with Marks (Theory):

Distribution of Theory Marks					
R Level	**U Level**	**A Level**	**N Level**	**E Level**	**C Level**
25	**30**	**25**		**20**	

Where R: Remember; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create (as per Revised Bloom's Taxonomy)

References/Suggested Learning Resources:

(a) Books:

1. Food Microbiology" by M. R. Adams and M. O. Moss
2. Modern Food Microbiology" by James M. Jay
3. Food Microbiology: Fundamentals and Frontiers" by Michael P. Doyle
4. Food Microbiology" by Dr. S. R. Vyas

(b) Open-source software and website:

1. Microbial colony counting software: OpenCFU
2. Data analysis: RStudio
3. Molecular biology tools: SnapGene Viewer

Web Resources:

1. FSSAI (https://fssai.gov.in)
2. WHO Food Safety (https://www.who.int/foodsafety)
3. NCBI (https://www.ncbi.nlm.nih.gov)

Suggested Course Practical List:

1. Preparation of culture media and sterilization techniques
2. Enumeration of microorganisms in food samples (spread plate, pour plate)
3. Identification of foodborne pathogens using biochemical tests
4. Antibiotic sensitivity testing of food microbes
5. Fermentation of milk to produce yogurt or cheese
6. Determination of microbial quality of drinking water

List of Laboratory/Learning Resources Required:

1. Laminar airflow
2. Incubators and autoclaves
3. Spectrophotometer
4. Microscopes
5. Analytical balance
6. Consumables: petri plates, media, test tubes

Suggested Project List:

1. Developing a probiotic food product
2. Investigating microbial spoilage in packaged food
3. Designing a HACCP plan for a food processing plant
4. Studying antimicrobial activity of natural preservatives

Suggested Activities for Students:

1. Microbial risk assessment in local food markets
2. Case studies on foodborne outbreaks
3. Organizing a seminar on emerging trends in food microbiology
4. Participation in food microbiology research projects

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