



GUJARAT TECHNOLOGICAL UNIVERSITY

Program Name: Bachelor of Vocation

Level: Under Graduate

Branch: Food Processing and Quality Control

Course / Subject Code : BV03009061

Course / Subject Name: Food Microbiology - Lab

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

Prerequisite: Students must have prior knowledge of basic microbiology concepts, fundamental biochemistry, and laboratory safety protocols.

Rationale:	This laboratory course aims to provide hands-on experience in techniques and methodologies used in food microbiology. It focuses on isolating, identifying, and analyzing microorganisms in food, ensuring food quality and safety, and understanding microbiological aspects related to food spoilage and preservation.
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Course Outcome:

After Completion of the Course, Student will able to:

No	Course Outcomes
01	Perform microbial isolation, enumeration, and identification in food samples using standard techniques.
02	Evaluate food samples for microbiological safety and interpret results based on established guidelines.
03	Apply microbiological methods to detect pathogens in food and understand spoilage mechanisms.
04	Utilize open-source tools and software for data analysis in food microbiology.

Teaching and Examination Scheme:

Teaching Scheme (in Hours)			Total Credits L+T+ (PR/2)	Assessment Pattern and Marks				Total Marks
L	T	PR	C	Theory		Tutorial / Practical		
				ESE (E)	PA / CA (M)	PA/CA (I)	ESE (V)	
0	0	2	1	0	0	20	30	50

Course Content:

Unit No.	Content	No. of Hours	% of Weightage
1.	Laboratory Practices in Food Microbiology	06	20



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	Introduction to microbiological laboratory safety and aseptic techniques. Preparation and sterilization of media. Cleaning and maintenance of laboratory equipment.		
2.	Microbial Isolation and Enumeration Techniques <ul style="list-style-type: none">Isolation techniques: Spread plate, pour plate, and streak plate methods.Enumeration methods: Colony-forming unit (CFU), serial dilution, and most probable number (MPN).Detection of indicator organisms (e.g., coliforms).	08	25
3.	Microbial Analysis of Food Samples <ul style="list-style-type: none">Detection and enumeration of spoilage microorganisms in food.Pathogen detection: Salmonella, E. coli, and Listeria spp.Techniques for yeast and mold isolation.	10	30
4.	Microbial Quality Assurance and Data Interpretation <ul style="list-style-type: none">Interpretation of microbiological data in food safety.Application of microbiological standards (e.g., FSSAI, WHO).Using open-source software for microbiological data analysis (e.g., RStudio, Python).	06	25
	Total	30	100

Suggested Specification Table with Marks (Practical):

Distribution of Theory Marks					
R Level	U Level	A Level	N Level	E Level	C Level
20	24	17	15	12	12

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:

- Modern Food Microbiology" by James M. Jay (Indian Edition).
- Textbook of Microbiology" by Ananthanarayan and Paniker.
- Food Microbiology" by William C. Frazier and Dennis C. Westhoff (Indian Edition).

(b) Open-source software and website:

- RStudio for data analysis.
- Python (pandas, matplotlib) for microbiological data visualization.



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• **Websites:**

3. [FSSAI Official Website](#)
4. [WHO Guidelines on Food Safety](#)
5. [NCBI Microbial Resources](#)

Suggested Course Practical List:

1. Preparation and sterilization of culture media.
2. Isolation of microorganisms using streak plate and pour plate techniques.
3. Enumeration of microorganisms using CFU and MPN techniques.
4. Detection of coliform bacteria in milk.
5. Analysis of microbial spoilage in fruits or vegetables.
6. Detection of foodborne pathogens using biochemical methods.
7. Study of microbial growth using turbidimetric methods.
8. Use of RStudio to analyze and visualize microbiological data.

List of Laboratory/Learning Resources Required:

1. Autoclave, laminar air flow, incubator, and hot air oven.
2. Microscope and colony counter.
3. Media preparation units and petri dishes.
4. Biochemical kits for microbial identification.
5. Open-source software tools (RStudio, Python).

Suggested Project List:

1. Microbiological analysis of dairy products for spoilage and pathogens.
2. Assessment of microbial quality in street food samples.
3. Isolation and identification of yeast and molds from bakery products.
4. Comparative analysis of home-cooked vs. commercially packed food.

Suggested Activities for Students:

1. Conduct a food safety awareness campaign using microbiological findings.
2. Create a poster presentation on recent advancements in food microbiology.
3. Develop an instructional video on aseptic techniques.
4. Participate in microbiology-based quizzes and group discussions.

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