



FACULTY OF ENGINEERING & TECHNOLOGY

Effective from Academic Batch: 2022-23

Programme: Bachelor of Technology (Food Processing Technology)

Semester: III

Course Code: 202070301

Course Title: Basic Food Microbiology

Course Group: Basic Science Courses

Course Objectives: To empower students with basic principles of Microbiology relevant to food.

Teaching & Examination Scheme:

Contact hours per week			Course Credits	Examination Marks (Maximum / Passing)				
Lecture	Tutorial	Practical		Theory		J/V/P*		Total
				Internal	External	Internal	External	
3	0	2	5	50/18	50/17	25/9	25/9	150/53

* J: Jury; V: Viva; P: Practical

Detailed Syllabus:

Sr.	Contents	Hours
1	Introduction to Microbiology: The scope and history of microbiology.	4
2	Morphology and Fine Structure: External and Internal structures of Bacteria, (membrane and major organelles, Appendages, Spores). Morphology and Characteristics of Fungi and Algae	5
3	Identification of Microbes: Characterization and Identification of microorganisms (Biochemical and staining methods). Principles and types of different microscopes.	5
4	Microbial Growth: Bacterial Growth phases, auxotroph, bradytroph, Replica plating, Microbial Reproduction and preservation of microorganisms.	4
5	Introduction to microbial genetics: Microbial genome and plasmids, detection of microorganisms using molecular, serological and proteomic techniques (SDS-PAGE, Blotting techniques, hybridization, PCR, ELISA).	7
6	Modification of Microbial Genome: Genotype changes (acquisition of resistance markers), Bacterial recombination, conjugation, transformation and transduction.	5



7	Significance of Microorganisms in Foods: Primary sources of microbes in food, Role of intrinsic and extrinsic parameters that effect microbial growth in foods.	5
8	Fermented Foods: Starter organism, Probiotics, Prebiotics, Synbiotics, functional foods, Fermented foods (dairy, traditional, meats).	5
9	Control of Microorganisms: Control of microorganisms by Physical and Chemical agents.	5
	Total	45

List of Practicals / Tutorials:

1	Introduction to Biosafety Levels and Lab equipment and Biosafety Levels: a) Laminar airflow/ Biosafety cabinets ; b) Autoclave ; c) Microscope
2	Preparation of growth media for microorganism.
3	Simple staining for visualization of bacteria a) Simple / Monochromatic staining ; b) Negative Staining
4	Differential staining for visualization of bacteria (Gram Staining)
5	Staining for visualization of fungi
6	To study the effect of various factors on microbial growth.
7	To perform viable plate count in a given sample by pour plate method.
8	To perform viable plate count in a given sample by spread plate method.
9	To study carbohydrate fermentation using Triple Sugar Iron Agar
10	Identification of enteric bacteria using biochemical tests (IMViC) a) Indole test; b) Methyl Red test; c) Voges-Proskauer test; d) Citrate Utilization test
11	To study microbial growth curve.
12	Open-ended problem

Reference Books:

1	General Microbiology by Roger Y. Stanier, John L. Ingram, Mark L. Wheel and Page R. Painter. (Macmillan Press Ltd.)
2	Microbiology by M. J. Pelczar Jr., E.C.S Chan and Noel R Krieg. Tata McGraw-Hill
3	Food Microbiology, W C Frazier and D C Westhoff, McGraw Hill Book Company, NY

Supplementary learning Materials:

1	http://highered.mcgraw-hill.com/sites/0072556781/student_view0/chapter13/animation_quiz_1.html
2	http://highered.mcgraw-hill.com/sites/0072943696/student_view0/chapter3/animation.html
3	http://users.ugent.be/~avierstr/principles/pcrani.html
4	http://aggie-horticulture.tamu.edu/food-technology/food-processing-entrepreneurs/microbiology-of-food/
5	http://highered.mcgraw-hill.com/sites/0072556781/student_view0/chapter13/animation_quiz_1.html

Pedagogy:

- Direct classroom teaching



- Audio Visual presentations/demonstrations
- Assignments/Quiz
- Continuous assessment
- Interactive methods
- Industrial/ Field visits
- Course Projects

Internal Evaluation:

The internal evaluation comprised of written exam (40% weightage) along with combination of various components such as Certification courses, Assignments, Mini Project, Simulation, Model making, Case study, Group activity, Seminar, Poster Presentation, Unit test, Quiz, Class Participation, Attendance, Achievements etc. where individual component weightage should not exceed 20%.

Suggested Specification table with Marks (Theory) (Revised Bloom's Taxonomy):

Distribution of Theory Marks in %						R: Remembering; U: Understanding; A: Applying; N: Analyzing; E: Evaluating; C: Creating
R	U	A	N	E	C	
20%	30%	20%	15%	15%	0%	

Note: This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from above table.

Course Outcomes (CO):

Sr.	Course Outcome Statements	%weightage
CO-1	Identify the microorganisms based on their structural and growth characteristics	15
CO-2	Identify and quantify the microorganisms using rapid techniques (molecular, immunological, proteomic)	20
CO-3	Develop the concept of genetic transfer mechanisms leading to multidrug resistance	15
CO-4	Understand and characterize the natural microflora, starter, probiotic and pathogenic	15
CO-5	Understand the methods to control microorganisms	15
CO-6	Understand the factors affecting growth of microorganisms in food	20

Curriculum Revision:

Version:	2
Drafted on (Month-Year):	June-2022
Last Reviewed on (Month-Year):	
Next Review on (Month-Year):	June-2025