



Gyanmanjari
Innovative University

Syllabus
Gyanmanjari Science College
Semester-7 (B.Sc.)

Subject: Principles of Food Science and Food Microbiology - BSCFT17401

Type of course: Major

Prerequisite: Students should have a Basic knowledge of Principles of Food Science and Food Microbiology, including food composition, food spoilage, and the role of microorganisms in food processing and preservation.

Rationale: It provides a foundational understanding of the composition, processing, preservation, and safety of food, along with the role of microorganisms in food spoilage, fermentation, and foodborne diseases. This knowledge is essential for students to understand food quality control, improve food safety practices, and apply microbiological principles in food processing and biotechnology.

Teaching and Examination Scheme:

Teaching Scheme			Credits	Examination Marks					Total Marks
CI	T	P		SEE		CCE			
			Theory	Practical	MSE	LWA/V	ALA		
3	0	2	4	75	25	30	20	50	200

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.

3 Credits * 25 Marks = 75 Marks (each credit carries 25 Marks) Theory
 1 Credits * 25 Marks = 25 Marks (each credit carries 25 Marks) Practical
 SEE 100 Marks will be converted in to 50 Marks
 CCE 100 Marks will be converted in to 50 Marks
 It is compulsory to pass in each individual component.



Course Content:

Unit No.	Course content	Hrs	% Weightage
1	<p>Introduction to Food Science</p> <ul style="list-style-type: none"> ● Introduction to Food Science: definition, scope, and importance, Food constituents: carbohydrates, proteins, lipids, vitamins, minerals, water, Physico-chemical properties of foods. ● Food quality: sensory and nutritional aspects. ● Food additives: types, functions, and safety. ● Food adulteration: common adulterants and detection methods. 	10	25
2	<p>Food Microbiology and Microbial Growth</p> <ul style="list-style-type: none"> ● Introduction to Food Microbiology. ● Types of microorganisms in food: bacteria, yeasts, molds, viruses. ● Sources of microbial contamination in food. ● Microbial Growth Requirements, Factors affecting microbial growth in food (FATTOM concept). ● Intrinsic and extrinsic factors influencing food spoilage. ● Microbial spoilage of foods: cereals, fruits, vegetables, meat, milk. ● Indicator organisms and food quality assessment. 	10	25
3	<p>Food Spoilage and Foodborne Diseases</p> <ul style="list-style-type: none"> ● Mechanism of food spoilage. ● Spoilage of different food groups. ● Foodborne infections and intoxications (<i>Salmonella</i>, <i>Staphylococcus</i>, <i>E. coli</i>, <i>Clostridium</i>). ● Mycotoxins in food (aflatoxins, ochratoxins). ● Thermal processing: pasteurization and sterilization. ● Non-thermal methods: irradiation, high pressure, food preservatives. ● HACCP principles (Hazard Analysis and Critical Control Points). 	10	25



4	<p>Food Fermentation and Industrial Applications</p> <ul style="list-style-type: none"> ● Introduction to food fermentation ● Fermented foods and beverages: curd, cheese, bread, vinegar, wine, beer. ● Role of microorganisms in fermentation: bacteria, yeast, fungi. ● Starter cultures and their importance. ● Probiotics and prebiotics. ● Industrial production of fermented foods. ● Quality control in the food industry. ● Basics of food regulations and standards. 	15	25
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Continuous Assessment:

Sr. No	Active Learning Activities	Marks
1	<p>Presentation: Students will Prepare a presentation on foodborne pathogens and upload the presentation on the GMIU web portal.</p>	10
2	<p>Field-Based Learning: Students will visit a local food market or dairy unit to observe hygiene and prepare a report and upload it on the GMIU web portal.</p>	10
3	<p>Research-Oriented Activities: Students will prepare literature reviews on emerging food preservation technologies and upload it on the GMIU web portal.</p>	10
4	<p>Project Work: Students will prepare a report on health benefits of fermented foods in the human diet and upload it on the GMIU web portal.</p>	10
5	Attendance	10
Total		50



Suggested Specification table with Marks (Theory):75

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

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 Outcome:

After learning the course, the students should be able to:	
CO1	Understand the basic principles of food science, including food composition, quality, additives, and preservation methods.
CO2	Explain the role of microorganisms in food systems and identify factors influencing microbial growth and food spoilage.
CO3	Analyze different types of food spoilage, foodborne diseases, and evaluate methods used for food preservation and safety.
CO4	Describe fermentation processes and the industrial applications of microorganisms in food production and quality control.

List of Practical:

Sr. No.	Descriptions	Unit No.	Hrs.
1.	Isolation and enumeration of microorganisms from food samples.	1	4
2.	Detection of coliform bacteria in food samples.	1	2
3.	Estimation of reducing sugars in food samples.	1	4
4.	Detection of spoilage organisms in dairy products.	2	2
5.	Estimation of lactose in milk samples.	2	4



6.	Viscosity measurement of liquid foods using a viscometer.	3	2
7.	Determine Microbial Quality of Milk by Resazurin Test	3	4
8.	Determination of pH of different food samples.	4	2
9.	Detection of coliform bacteria in water samples.	4	2
10.	Detection and analysis of food adulterants in milk, oil, and spices.	4	4
Total		30	

Instructional Method:

The course delivery method will depend upon the requirement of content and the needs of students. The teacher, in addition to conventional teaching methods by black board, may also use any tools such as demonstration, role play, Quiz, brainstorming, MOOCs etc.

From the content 10% 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 on the basis of Active Learning Assignment

Practical/Viva examination will be conducted at the end of semester for evaluation of performance of students in the laboratory.

Reference Books:

1. Adams, M. R., & Moss, M. O. (2008). *Food microbiology* (3rd ed.). Royal Society of Chemistry.
2. Potter, N. N., & Hotchkiss, J. H. (1995). *Food science* (5th ed.). Springer.
3. Roday, S. (2007). *Food hygiene and sanitation* (2nd ed.). McGraw-Hill Education.
4. Food Safety and Standards Authority of India. (n.d.). *FSSAI manuals and guidelines*.
5. Desrosier, N. W. (1977). *The technology of food preservation* (4th ed.). AVI Publishing Company.
6. Ray, B., & Bhunia, A. (2013). *Fundamentals of food microbiology* (5th ed.). CRC Press.
7. Frazier, W. C., & Westhoff, D. C. (2004). *Food microbiology* (4th ed.)

