



Gyanmanjari
Innovative University

Course Syllabus
Gyanmanjari Science College
Semester-4 (B.Sc.)

Subject: Microbiology of Air, Food and Milk - BSCMB14313

Type of course: Minor

Prerequisite: Basic knowledge of fundamental principles in microbiology

Rationale: It helps to understand the role of organisms present in air, milk and food and preservation techniques and methods used by the industry.

Teaching and Examination Scheme:

Teaching Scheme			Credits	Examination Marks					Total Marks	
CI	T	P		C	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.





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Course Content:

Unit No	Course content	Hrs	% Weightage
1	Chapter:1 Aerobiology <ul style="list-style-type: none"> • Origin, number and kinds of microorganisms present in air. • Methods of enumeration of microorganisms present in air. • Airborne pathogenic organisms. • Airborne diseases • Air sanitation: its importance in hospitals and industries. 	10	25
2	Chapter:2 Food Microbiology <ul style="list-style-type: none"> • Food as a substrate for microorganisms. • Microbial flora of fresh food: Meats, poultry, eggs, fruits and vegetables. • Extrinsic and intrinsic factors affecting types and number of microbes • Food borne diseases. • Types of fresh food spoilage, Spoilage of canned food. • Fermented food products: Pickles, sauerkraut and bread. • Microbes as food: Mushrooms and <i>Spirulina</i>. • Prebiotic and probiotic food: its health benefits, and examples. 	10	25
3	Chapter:3 Milk Microbiology <ul style="list-style-type: none"> • Sources of microorganisms in milk • Spoilage of milk and milk products: <ul style="list-style-type: none"> ○ Biochemical types of bacteria in milk. ○ Pathogenic types of bacteria in milk. ○ Temperature characteristics of bacteria in milk. • Grading of milk. • Milk borne diseases. • Fermented dairy products: <ul style="list-style-type: none"> ○ Starter culture ○ Cheese: Types, curdling, processing, ripening. ○ Other fermented dairy products: Yogurt, cultured buttermilk, acidophilus milk, Bulgarian milk, kefir, kumiss. 	10	25



4	Chapter:4 Methods in Food Microbiology and Preservation Techniques: <ul style="list-style-type: none"> • Preservation of food and milk <ul style="list-style-type: none"> A. General principles B. Methods of preservation: <ul style="list-style-type: none"> (i) Use of aseptic handling (ii) High temperature: Pasteurization, sterilization, canning (iii) Low temperature: Refrigeration and freezing (iv) Dehydration (v) Osmotic pressure (vi) Preservatives (vii) Radiations: Ionizing and non-ionizing radiations • Bacteriological analysis of milk. <ul style="list-style-type: none"> A. Grading of milk: (i) MBRT (ii) Resazurin test. B. Determination of efficiency of Pasteurization: Phosphatase test. • Microbiological criteria of food safety <ul style="list-style-type: none"> A. Role of FDA, FSSAI and BIS. B. Various food certification marks: ISI, Agmark, FPO C. HACCP. 	15	25
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Continuous Assessment:

Sr. No	Active Learning Activities	Marks
1	Check your Surrounding Air flora Students will perform air quality by using any nutrient medium and capture/ analyze it and photo need to upload on GMIU web portal.	10
2	Give a fit check to your healthy life Students will check food by performing microbiological analysis, capture it and photo need to upload on GMIU web portal.	10
3	Probiotic analysis Students will check Probiotics present in milk products by performing microbiological analysis, capture the organism photo and upload it on GMIU web portal.	10
4	Identify preservation techniques use by industry Students need to identify various preservation techniques by visiting industry. Students need to prepare a report and will be upload on GMIU web portal.	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	Apply the principles and methods for air sanitation.
CO2	Analyze types of food and its spoilage characteristics and microorganisms involved.
CO3	Acquire knowledge of milk characteristics and its fermented products.
CO4	Understand the principles and methods of food and milk preservation.

List of Practical:

Sr. No	Descriptions	Unit No	Hrs
1	Qualitative analysis of air flora by settling plate technique.	1	4
2	Quantitative analysis of air flora by settling plate technique.	1	4
3	Microbiological analysis of food: Standard plate count of food sample/milk sample.	2	4
4	Determination of MPN of coliforms in contaminated food.	2	2
5	Determination of microbial load of raw and pasteurized milk by use of MBRT.	3	2
6	Sugar utilization test: glucose, xylose, mannitol, lactose, maltose and sucrose.	3	2



7	Starch utilization test and qualitative check of amylase activity.	2	2
8	Lipid hydrolysis test and qualitative check of lipase activity.	3	2
9	Nitrate reductase qualitative activity check.	4	2
10	To check H ₂ S production ability of microbes.	4	2
11	To check urea hydrolysis capability of microbes.	2	2
12	To check gelatinase activity of microbes.	4	2
Total			30

Instructional Method:

The course delivery method will depend upon the requirement of content and need of students. The teacher in addition to conventional teaching method by black board, may also use any of 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 laboratory.

Reference Books:

- [1] Microbiology: Pelczar MJ, Chan ECS and Kreig NR, Tata Mc Grow Hill.
- [2] General Microbiology: Stanier RY, Adelberg EA and Ingraham JL, Mac Millan Press Inc.
- [3] Frazier W C and Westhoff D C (1988), Food Microbiology, 4th edn. McGraw-Hill Book Company, NY.
- [4] Prescott L, Harley J P, and Klein D A, (2008), Microbiology, 7th edn. Wm C. Brown - McGraw Hill, Dubuque, IA.
- [5] Microbiology: An introduction: Tortora GJ, Funke BR and Case CL, Pearson Education Inc.
- [6] Elementary Microbiology: Modi HA, volume- I & II.
- [7] General Microbiology: Dubey RC.
- [8] Practical Microbiology: Patel RJ, Aditya Publications.
- [9] Practical Microbiology: Dubey RC and Maheshwari DK, S Chand Publication.

