

**UNIVERSITY OF MADRAS**  
**B.Sc. DEGREE PROGRAMME IN MICROBIOLOGY**  
**SYLLABUS WITH EFFECT FROM 2023-2024**

Subject Code	Subject Name	Category	L	T	P	S	Credits	Inst. Hours	Marks		
									CIA	External	Total
336C6B	Food, Dairy and Probiotic Microbiology	Core Course – XIV	Y	-	-	-	4	6	25	75	100
<b>Course Objectives</b>											
CO1	To impart current knowledge of basic and applied microbiological aspects of fluid milks and dairy products for improved quality and food safety.										
CO2	Gives an insight into various types of food borne diseases and their prevention										
CO3	To gain information about microflora of milk										
CO4	To study about the production of fermented dairy products										
CO5	To impart current knowledge of probiotics, prebiotics and functional dairy foods for the health benefits To create a sustainable environmentally and technologically advanced dairy farm										
<b>UNIT</b>	<b>Details</b>							<b>No.of Hours</b>	<b>Course Objectives</b>		
I	Food as a substrate for microorganisms - Microorganisms important in Food Microbiology; Molds, yeasts and bacteria -General Characteristics - Classification and importance. Principles of food preservation - Asepsis - Removal of microorganisms, - High temperature - Low temperature - Drying - Food additives. Nanoscience in food preservation; microencapsulation.							12	CO1		
II	Contamination and spoilage of food products - Food borne infections ( <i>Bacillus cereus</i> , <i>Salmonella</i> sp., <i>Shigella</i> sp., <i>Listeria monocytogenes</i> and <i>Campylobacter jejuni</i> ) and intoxications – ( <i>Staphylococcus aureus</i> , <i>Clostridium botulinum</i> , <i>Clostridium perfringens</i> and mycotoxins) Food borne disease outbreaks - newly emerging pathogens. Conventional and Novel technology in control of food borne pathogens and preventive measures - Food sanitation - plant sanitation - Employees' health standards. Regulatory Agencies & criteria for food safety.							15	CO2		
III	Microflora of raw milk - sources of contamination. Spoilage and preservation of milk and milk products. -antimicrobial systems in raw milk. Importance of biofilms, their role in transmission of pathogens in dairy products and preventive strategies.							15	CO3		
IV	Food fermentations: Indian pickles, bread, vinegar, fermented vegetables (Sauerkraut), fermented dairy products (Yoghurt, Cheese, Acidophilus milk, Kefir, Koumiss). Oriental fermented foods-Miso – Tempeh, Ontjom, Natto and Idli. Spoilage and defects of fermented dairy products - Functional fermented foods and nutraceuticals, Bioactive proteins and bioactive peptides, Genetically modified foods.							15	CO4		

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V	Probiotic microorganisms, concept, definition, safety of probiotic microorganisms, legal status of probiotics, Characteristics of Probiotics for selection: stability maintenance of probiotic microorganisms. Role of probiotics in health and disease: Mechanism of probiotics. Application of bacteriocins in foods. Biopreservation. Prebiotics: concept, definition, criteria, types and sources of prebiotics, prebiotics and gut microflora - Prebiotics and health benefits: mineral absorption, immune response, cancer prevention, elderly health and infant health, prebiotics in foods.	15	CO5
	<b>Total</b>	72	
<b>Course Outcomes</b>			
<b>Course Outcomes</b>	On completion of this course, students will;		
CO1	Gain knowledge about food as a substrate for various microbes, Understand about the principles and application of different types of food spoilage and preservation technique,	PO7,PO8,PO10	
CO2	Acquire a thorough understanding of food borne diseases, testing methods, and preventive technique	PO5,PO10	
CO3	Gain information about spoilage of milk and its products and its antimicrobial properties	PO5,PO7	
CO4	Learn about the various fermented product and its various stage spoilage	PO7,PO8,PO10	
CO5	Impart current knowledge of probiotics, prebiotics and functional dairy foods for the health benefits	PO5,PO6	
<b>Text Books</b>			
1.	Frazier WC and West off DC. (2017). Food microbiology. 5 <sup>th</sup> Edition TATA McGraw Hill Publishing Company Ltd. New Delhi.		
2.	Adams, M.R., Moss, M.O.(2018). Food Microbiology 1 <sup>st</sup> edition. New Age Publishers by New Age International (P) Ltd., Publishers.		
3	R.C. Dubey. (2014). Advanced Biotechnology. S. Chand publishers.		
4	Banwart GJ. (1989). Basic food microbiology, Chapman & Hall, New York.		
5	Sugumar D. (1997). Outlines of dairy technology, Oxford University press. 1997.		
<b>References Books</b>			
1	Jay JM, Loessner MJ and Golden DA.(2005). Modern Food Microbiology. 7 <sup>th</sup> Edition CBS Publishers and Distributors, Delhi, India.		
2	Prescott, Harley and Klein Wim.(2008). Microbiology, 7 <sup>th</sup> Edition McGraw Hill Publications.		
3	Robinson, R. K.(2002). Dairy Microbiology Handbook - The Microbiology of Milk and Milk Products (Third Edition), A John Wiley & Sons, Inc., New York.		
4	Yuankunlee,Sepposalminen. (2008). Handbook of probiotics and prebiotics Second Edition. A John Wiley & Sons publication Inc.		
5	DharumauraiDhansekaran, AlwarappanSankaranarayanan. (2021). Advances in Probiotics Microorganisms in Food and Health 1 <sup>st</sup> Edition. eBook ISBN:9780128230916.		

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<b>WEB RESOURCES</b>		
1	<a href="https://www.researchgate.net/publication/15326559_A_Dynamic_Approach_to_Predicting_BacterialGrowth_in_Food/link/5a1d2e02aca2726120b28eba/download">https://www.researchgate.net/publication/15326559_A_Dynamic_Approach_to_Predicting_BacterialGrowth_in_Food/link/5a1d2e02aca2726120b28eba/download</a>	
2	<a href="https://www.fda.gov/food/laboratory-methods-food/bam-foodsamplingpreparation-sample-homogenate">https://www.fda.gov/food/laboratory-methods-food/bam-foodsamplingpreparation-sample-homogenate</a>	
3	<a href="https://www.researchgate.net/publication/243462186_Foodborne_diseases_in_India_-_A_review">https://www.researchgate.net/publication/243462186_Foodborne_diseases_in_India_-_A_review</a>	
4	<a href="https://www.researchgate.net/publication/228662659_Fermented_Dairy_Products_Starter_Cultures_and_Potential_Nutritional_Benefits/link/000084160cf23f86393d5764/download">https://www.researchgate.net/publication/228662659_Fermented_Dairy_Products_Starter_Cultures_and_Potential_Nutritional_Benefits/link/000084160cf23f86393d5764/download</a>	
5	<a href="https://www.fda.gov/food">https://www.fda.gov/food</a>	
<b>Methods of Evaluation</b>		
<b>Internal Evaluation</b>	Continuous Internal Assessment Test	25 Marks
	Assignments	
	Seminars	
	Attendance and Class Participation	
<b>External Evaluation</b>	End Semester Examination	75 Marks
	Total	100 Marks
<b>Methods of Assessment</b>		
Recall (K1)	Simple definitions, MCQ, Recall steps, Concept definitions	
Understand / Comprehend (K2)	MCQ, True/False, Short essays, Concept explanations, Short summary or overview	
Application (K3)	Suggest idea/concept with examples, Suggest formulae, Solve problems, Observe, Explain	
Analyse (K4)	Problem-solving questions, Finish a procedure in many steps, Differentiate between various ideas, Map knowledge	
Evaluate (K5)	Longer essay/ Evaluation essay, Critique or justify with pros and cons	
Create (K6)	Check knowledge in specific or offbeat situations, Discussion, Debating or Presentations	

**Mapping with Programme Outcomes**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1							S	S		M	
CO2					S					M	
CO3					S		M				
CO4							S	S		M	
CO5					M	M					