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
136C1A	**FUNDAMENTALS OF MICROBIOLOGY AND MICROBIAL DIVERSITY**	**Core-1**	**Y**	**-**	**-**	**-**	**5**	**5**	**25**	**75**	**100**

Course Objectives

CO1	Learn the fundamental principles about different aspects of Microbiology including recent developments in the area.
CO2	Describe the structural organization, morphology and reproduction of microbes.
CO3	Explain the methods of cultivation of microbes and measurement of growth.
CO4	Understand the microscopy and other basic laboratory techniques – culturing, disinfection and sterilization in Microbiology.
CO5	Compare and contrast the different methods of sterilization.

UNIT	Details	No.of Hours	Course Objectives
I	History and Evolution of Microbiology, Classification – Three kingdom, five kingdom, six kingdom and eight kingdom. Microbial biodiversity: Introduction to microbial biodiversity- ecological niche. Basic concepts of Eubacteria, Archaebacteria and Eucarya. Conservation of Biodiversity.	12	CO1
II	General characteristics of cellular microorganisms (Bacteria, Algae, Fungi and Protozoa) and acellular microorganisms - (Viruses, Viroids, Prions), Differences between prokaryotic and eukaryotic microorganisms. Structure of Bacterial cell wall, cell membrane, capsule, flagella, pili, mesosomes, chlorosomes, phycobilisomes, spores, and gas vesicles. Structure of fungi (Mold and Yeast), Structure of microalgae.	12	CO2
III	Bacterial culture media and pure culture techniques. Mode of cell division, Quantitative measurement of growth. Anaerobic culture techniques.	12	CO3
IV	Microscopy – Simple, bright field, dark field, phase contrast, fluorescent, electron microscope – TEM & SEM, Confocal microscopy, and Atomic Force Microscopy. Stains and staining methods.	12	CO4
V	Sterilization–moist heat - autoclaving, dry heat – Hot air oven, radiation – UV, Ionization, filtration – membrane filter and disinfection, antiseptic; Antimicrobial agents.	12	CO5
	Total	60	

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Course Outcomes		
Course Outcomes	On completion of this course, students will;	
CO1	Study the historical events that led to the discoveries and inventions and understand the Classification of Microorganisms.	PO5, PO6, PO10
CO2	Gain Knowledge of detailed structure and functions of prokaryotic cell organelles.	PO10
CO3	Understand the various microbiological techniques, different types of media, and techniques involved in culturing microorganisms.	PO11
CO4	Explain the principles and working mechanism of different microscopes/Microscope, their function and scope of application.	PO4, PO11
CO5	Understand the concept of asepsis and modes of sterilization and disinfectants**.**	PO4, PO11
Text Books		
1	Pelczar.M. J., Chan E.C.S. and Noel. R.K. (2007). Microbiology. 7th Edition.,McGraw – Hill, New York.	
2	Willey J., Sherwood L., and Woolverton C. J., (2017). Prescott's Microbiology. 10th Edition., McGraw-Hill International edition.	
3	Tortora, G.J., Funke, B.R., Case,C.L. (2013). Microbiology. An Introduction 11th Edition., A La Carte Pearson.	
4	Salle. A.J (1992). Fundamental Principles of Bacteriology. 7th Edition., McGraw Hill Inc.New York.	
5	Boyd, R.F. (1998). General Microbiology,2nd Edition., Times Mirror, Mosby CollegePublishing, St Louis.	
References Books		
1	Jeffrey C. Pommerville., Alcamo's Fundamentals of Microbiology (9th Edition). Jones &Bartlett learning 2010.	
2	Stanier R.Y, Ingraham J. L., Wheelis M. L., and Painter R. R. (2010). General Microbiology, 5th Edition., MacMillan Press Ltd	
3	Tortora, G.J., Funke, B.R. and, Case, C.L (2013). Microbiology-An Introduction, 11th Edition., Benjamin Cummings.	
4	Nester E., Anderson D., Roberts C. E., and Nester M. (2006). Microbiology-A Human Perspective, 5th Edition. McGraw Hill Publications.	
5	Madigan M.T., Martinko J.M., Stahl D.A, and Clark D. P. (2010). Brock - Biology of Microorganisms, 13th Edition Benjamin-Cummings Pub Co.	

Web Resources	
1	https://www.cliffsnotes.com/study-guides/biology/microbiology/introduction-to-microbiology/a-brief-history-of-microbiology
2	https://www.keyence.com/ss/products/microscope/bz-x/study/principle/structure.jsp
3	https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6604941/#
4	https://bio.libretexts.org/@go/page/9188
5	https://courses.lumenlearning.com/boundless-microbiology/chapter/microbial-nutrition/

Methods of Evaluation		
Internal Evaluation	Continuous Internal Assessment Test	25 Marks
	Assignments	
	Seminars	
	Attendance and Class Participation	
External Evaluation	End Semester Examination	75 Marks
	Total	100 Marks

Methods of Assessment	
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
Analyze (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					M	M				M	
CO2										M	M
CO3											S
CO4				M							S
CO5				M							S