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	Exter-nal	Total
136C21	**Microbial Physiology and Metabolism**	**CCIV- Core Practical II**	**-**	**-**	**Y**	**-**	**5**	**5**	**40**	**60**	**100**

Course Objectives	
CO1	Understand the principles of motility test.
CO2	Understand the basic concepts of staining methods.
CO3	Learn the bacterial count using different methods and anaerobic culture.
CO4	Study the morphological demonstration of microorganisms and identification.
CO5	Study the biochemical identification of the bacteria.

UNIT	Details	No.of Hours	Course Objectives
I	Motility demonstration: Hanging drop, wet mount preparation, semi-solid agar, Craigie's tube method. Staining techniques: Smear preparation, permanent specimen preparation, capsular, and acid-fast staining	12	CO1
II	Direct counts – Direct cell count (Petroff-Hausser counting chamber), turbidometry. Viable count - pour plate, spread plate. Bacterial growth curve.	12	CO2
III	Anaerobic culture methods. Antibiotic sensitivity testing: Disc diffusion test - Quality control with standard strains.	12	CO3
IV	Morphological variations in algae, fungi and protozoa. Micrometry: Demonstration of the size of yeast, fungal filaments and protozoa.	12	CO4
V	Methods of Bacterial Identification - Morphological, physiological, and biochemical methods - IMViC test, H_2S, TSI, oxidase, catalase, urease test, and carbohydrate fermentation test. Maintenance of pure culture, paraffin method, stab culture, maintenance of mold culture.	12	CO5
	Total	60	

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Course Outcomes		
CO	On completion of this course, students will:	
CO1	Describe hanging drop, wet mount preparation, semi-solid agar, Craigie's tube method.	PO6, PO7, PO8, PO9, PO11
CO2	Demonstrate Smear preparation, permanent specimen preparation, Capsular, and Acid-fast staining.	PO6, PO7, PO8, PO9, PO11
CO3	Explain antibiotic sensitivity testing: Disc diffusion test- quality control with standard strains.	PO6, PO7, PO8, PO9, PO11
CO4	Describe demonstration of the size of yeast, fungal filaments and protozoa.	PO6, PO7, PO8, PO9, PO11
CO5	Elaborate on the bacterial identification- morphological, physiological, and biochemical methods.	PO6, PO7, PO8, PO9, PO11
Text Books		
1	James G Cappucino and N. Sherman MB (1996). A lab manual Benjamin Cummins, New York .	
2	Kannan. N (1996).Laboratory manual in General Microbiology. Palani Publications.	
3	Sundararaj T (2005). Microbiology Lab Manual (1st edition) publications.	
4	Gunasekaran. P (2007). Laboratory manual in Microbiology. New age international publisher.	
5	Elsa Cooper (2018). Microbial Physiology: A Practical Approach. Callisto Reference publisher.	
References Books		
1	DavidWhite., James Drummond., Clay Fuqua (2012) Physiology and Biochemistry of Prokaryotes. 4th Ed. Oxford University Press, New York.	
2	Robert K. Poole (2004). Advances in Microbial Physiology, Elsevier Academic Press, New York, Volume 49.	
3	Kim B.H., Gadd G.M. (2008). Bacterial Physiology and Metabolism. Cambridge University Press, Cambridge.	
4	Dawes, I.W and Sutherland L.W (1992). Microbial Physiology (2nd edition), Oxford Blackwell Scientific Publications.	
5	Moat, A.G and J.W Foaster, (1995). Microbial Physiology, 3rd edition. Wiley – LISS, A John Wiley & Sons. Inc. Publications.	
Web Resources		
1	https://sites.google.com/site/microbial physiologyoddsem/teaching-contents	
2	https://courses.lumenlearning.com/boundless-microbiology/chapter/microbial-Nutrition	
3	https://onlinecourses.swayam2.ac.in/cec20_bt14/preview	
4	https://www.studocu.com/microbial-physiology-practicals	
5	https://www.agr.hokudai.ac.jp/microbial-physiology	

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Methods of Evaluation		
Internal Evaluation	Continuous Internal Assessment Test	40 Marks
	Assignments	
	Seminars	
	Attendance and Class Participation	
External Evaluation	End Semester Examination	60 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	L	M	L		M
CO2						M	M	L	M		L
CO3						L	M	M	L		M
CO4						L	M	M	M		M
CO5						M	M	M	M		M