

UNIVERSITY OF MADRAS
M.Sc. DEGREE PROGRAMME IN ZOOLOGY
 SYLLABUS WITH EFFECT FROM 2023-2024

931DCE4

Course Objectives:		
The main objectives of this course are:		
1.	Acquire a fairly good understanding of the history, structure of microorganisms, nutritional requirements and taxonomy of the microbes.	
2.	Impart the role of microorganisms between the ecosystem and organisms.	
3.	Obtain knowledge about the infectious agents including how infectious diseases are transmitted through the organisms and food materials.	
4.	Acquires knowledge about various industrially relevant microbial products and their production process.	
5.	Emphasis the vital role of microorganisms in biotechnology and its useful products for the welfare of human being.	
Course	:	Discipline Centric Elective – 4
Course title	:	Microbiology
Credits	:	3
Pre-requisite:		
Fundamental knowledge on microorganisms, their culture and applications in various fields.		
Expected Course Outcome:		
On the successful completion of the course, student will be able to		
1.	Understand the Basics and various techniques in microbial culturing and maintenance.	K2
2.	Upgrade the skills of utilizing microbes for environmental bioremediation.	K6
3.	Acquire the knowledge of microbes used in medical and food industries.	K5
4.	Be familiar with the role of microbes in agriculture and environment.	K3
5.	Gain more information about microbes and their beneficial uses in food, agricultural and pharmaceutical industries.	K4

K1 - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate; **K6** - Create

Units	
I	Growth and nutrition of microbes , Classification of microbes-Phenotypic and taxonomic characters - Culturing and maintenance of microorganisms - media preparation (PDA and nutrient agar), sterilization, isolation of microorganism, their purification and maintenance - methods of microbial identification- Staining of microorganisms (simple and Gram staining).
II	Applied microbiology: Microbial ecology-role of microorganisms in the productivity of ecosystems-interactions between microorganisms and with

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	plants and animals- microbes in biodeterioration and waste treatment.
III	Medical microbiology: Pathogenic microbes-bacterial (TB, Leptospirosis Tetanus), viral (Hepatitis ,AIDS , Corona) diseases - Cure, control and prevention; Food and dairy microbiology- role of microorganisms in food production; Dairy and non-dairy products-fermented foods
IV	Industrial microbiology: Industrial use of microbes- Products of industrial microbiology - ethanol, vinegar, vitamin B12,
V	Biotechnological potentials of microbes-production of food (single cell protein), pharmaceuticals (antibiotics, vaccines etc), biofertilisers (BGA), biopesticides (Bacillus thuringiensis), biopolymers, biosurfactants - Disposal of microbes and biosafety.
Reading list	
<ol style="list-style-type: none"> 1. Pelczar, M.J., Reid, R.D. and Chan, E.C.S. 1983. Microbiology, Tata McGraw Hill Publishing Co., New Delhi, pp-960. 2. Sullia, S.B. and Shantharam, S. 1998. General Microbiology. Oxford and IBH Publishing Co. Pvt. Ltd., New Delhi, pp-588. 3. Dubey, R.C. and Maheswari, D.K. 2005. A Textbook of Microbiology, S.Chand and Company Ltd., New Delhi, pp-1056. 4. Ananthanarayan, R. and Paniker, C.K.J. 2020. Text book of Microbiology. Eleventh Edition, Universities Press, pp-680. 5. Jay, J.M. 2005. Modern Food Microbiology. CBS Publishers, New Delhi. 6. https://www.cliffsnotes.com/study-guides/biology/microbiology 7. https://www.easybiologyclass.com/microbiology-lecture-notes-study-materials-online-tutorials-for-students-teachers/ 8. https://sites.highlands.edu/faculty-jhitzema/microbiology-homepage/microbiology-lecture-materials/ 9. http://www.lamission.edu/lifesciences/lecturenote/aemic20lectnote.htm 	
Recommended texts	
<ol style="list-style-type: none"> 1. 1. Willey, J., Sandman, K. and Wood, D. 2020. Prescott's Microbiology, 11th Edition. McGraw Hill Education, pp-1104. 2. Tortora, J.G., Funke, B.R., Case, C.L., Weber, D. and Bair, W.B. 2018. Microbiology: An Introduction, 14th Edition. PearsonPublishers, pp-960. 3. Adams, M.R. and Moss, M.O. and McClure, P. 2015, Food Microbiology, Royal Society Publications, Cambridge, pp-562. 4. Pommerville, J.C. 2013. Alcamo's Fundamentals of Microbiology. 10th Edition. Jones and Bartlett Learning, pp-845. 5. Okafor, N.2007. Modern Industrial Microbiology & Biotechnology. 1st Edition. CRC Press, USA, pp-550. 6. Glazer, A.N. and Nikaido, H. 2007. Microbial Biotechnology: Fundamentals of Applied Microbiology. 2nd Edition. Cambridge University Press, pp-576. 	

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7. Baltz, R.H., Davies, J.E. and Demain, A.L. 2010. Manual of Industrial Microbiology and Biotechnology, ASM Press Washington, DC, pp-788.
8. Atlas, R.M. and Bartha, R. 1993. Microbial Ecology. 3rd Edition. Benjamin Cummings Publishing Co, USA, pp-576.
9. Steinkraus, K.H. 1983. Hand Book of Indigenous Fermented Food, Parcel Decker Inc, New York, USA, pp-792.
10. Reed, G. 2004. Prescott & Dunn's Industrial Microbiology. 4th Edition, AVI Publishing Co., Connecticut, USA, pp-883.

Mapping with Programme Outcomes*

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

*S-Strong; M-Medium; L-Low