

Title of the Course: ENVIRONMENTAL MICROBIOLOGY AND BIOREMEDIATION [P]**Course Code: MIC-522****Number of Credits: 1, Practical****Contact hours: 30****Effective from Academic Year: 2022-23**

Prerequisites	It is assumed that the students have a basic knowledge of environmental pollution and microbiology.	
Objective:	To familiarize with the techniques of waste water analysis, biodegradation of aromatic pollutants and bioremediation of metal/metalloid pollutants.	
Content:		(30)
1.	Analysis of water samples for COD, BOD and microbial load.	
2.	Isolation of hydrocarbon degrading microorganism (degradation of sodium benzoate/Naphthalene).	
3.	Isolation of biosurfactant producing microorganisms.	
4.	BATH assay for microbial adherence.	
5.	Isolation of selenite/tellurite resistant microorganisms for application in bioremediation.	
Pedagogy:	Hands-on experiments in the laboratory, video, online data	
References/ Readings	Cavicchioli, R., Ripple, W. J., Timmis, K. N., Azam, F et al.. Scientists' warning to humanity: microorganisms and climate change. Nature reviews microbiology, 17, 569- 586, (2019).	
	Kennish, M. J. Practical Handbook of Estuarine and Marine Pollution. CRC Press, Francis and Taylor (2017).	
	King, R. B., Sheldon, J. K., & Long, G. M. Practical Environmental Bioremediation: The Field Guide. CRC Press (1997).	
	Liu, W-T. and Jansson, J. K., Environmental Molecular Microbiology, Caister Academic Press (2010).	
	Medigan, M. T., Bender, K. S., Bukley, D. H., Sattley, W. M., & Stahl, D. A. Brock Biology of Microorganisms. Pearson (2017).	
	Mitchell, R. and Kirchman, D. L., Microbial Ecology of the Oceans, Wiley Publishers (2018).	
	Munn, C., Marine Microbiology: Ecology and Applications, Garland Science, Taylor and Francis Group, N.Y (2020).	
	Murugesan, A. G. and Rajakumari, C., Environmental Science and Biotechnology: Theory and Techniques, MJP Publishers (2019).	
	Naik, M. and Dubey, S. K., Marine Pollution and Microbial Remediation, Springer Publications (2017).	
	Norris, J. R. and Ribbons, D.W., Methods in Microbiology, Vol. 18 & 19, Academic Press (2012).	
	Osborn, A. M. and Smith, C. J., Molecular Microbial Ecology, Taylor and Francis (2005).	
	Satyanarayana, T., Johri, B. and Anil, T., Microorganisms in Environmental Management, Springer Publishers (2012).	
	Scragg, A. H., Environmental Biotechnology, Longman Publishers. (199)	
	Sharma, P. D., Environmental Microbiology, Alpha Science	

	International (2005).	
	Willey, J. M., Sherwood, L. M., & Woolverton, C.J. Prescott's Microbiology. McGraw-hill Education (2016).	
Course Outcomes	● Evaluate quality of water for pollution. ● Isolate microorganisms with specialized bioremedial potential. ● Establish the microbial physiology for bioremedial applications. ● Demonstrate the role of microorganisms in pollution abatement.	