

**Name of the Programme:** M.Sc. Marine Biotechnology

**Course Code:** MBT-501

**Title of the Course:** LAB I: TECHNIQUES IN MICROBIOLOGY, MARINE BIOLOGY AND CHEMISTRY

**Number of Credits:** 3

**Effective from AY:** 2022-23

<b>Pre-requisites for the Course:</b>	No prerequisite is required.	
<b>Course Objectives:</b>	<ol style="list-style-type: none"><li>1) To introduce the students to various methods to isolate and culture bacteria using different media, learn marine sampling methods.</li><li>2) measure the physical and chemical parameters of the marine aquatic system.</li></ol>	
<b>Content:</b>	<ol style="list-style-type: none"><li>1. Preparation of solid &amp; liquid media, Differential and Selective media: Isolation of bacteria from seawater /sediments samples, Enumeration: serial dilution methods, plating.</li><li>2. Maintenance of organisms: Streaking, slants and stabs cultures.</li><li>3. Study of morphology and cultural characteristics.</li><li>4. Gram staining.</li><li>5. Motility</li><li>6. Antimicrobial sensitivity test and demo of drug resistance.</li><li>7. Cultivation of fungi: Slide, chunk and cover slip techniques.</li></ol>	<b>No. of hours</b>       45
	<ol style="list-style-type: none"><li>8. Samplers: water samplers, dredges, grabs, snappers.</li><li>9. Sampling (Field trips) and identification:<ol style="list-style-type: none"><li>i. Phytoplankton &amp; Zooplankton.</li><li>ii. Nekton</li><li>iii. Benthos</li></ol></li><li>10. Estimations:<ol style="list-style-type: none"><li>i. Chlorophyll</li><li>ii. Nutrients: nitrates, nitrites, phosphates, silicates</li><li>iii. Dissolved oxygen</li><li>iv. Salinity, pH &amp; alkalinity.</li></ol></li></ol>	45

<b>Pedagogy:</b>	Hands-on experiments in the laboratory, learning skills in sampling techniques.
<b>References/ Readings:</b>	<ol style="list-style-type: none"> <li>1. A. Eleftheriou and A. McIntyre, Methods for the Study of Marine Benthos, Wiley Publisher, 2005.</li> <li>2. A. Sastry, Essentials of Practical Microbiology, India: Jaypee Brothers Medical Publishers Pvt. Limited, 2021.</li> <li>3. G. J. Bakus, Quantitative Analysis of Marine Biological Communities: Field Biology and Environment, Wiley publisher, 2007</li> <li>4. K. Grasshoff, K. Kremling, M. Ehrhardt, Methods of Seawater Analysis, Wiley Publisher, 2009.</li> <li>5. L. Yuncong, M. Kati , Water Quality Concepts, Sampling, and Analyses. CRC Press LLC, 2019.</li> <li>6. M.L. Leo Nollet, S. P. Leen, Gelder, Handbook of Water Analysis, CRC Press, 2013.</li> <li>7. M. E. McCance, W. F. Harrigan, Laboratory Methods in Microbiology. Elsevier Science, 2014.</li> <li>8. M. Omori, T. Ikeda, Methods in Marine Zooplankton Ecology. Krieger Publisher, 1992.</li> <li>9. R. Baird, A. Eaton, E.W. Rice, L. Bridgewater, Standard methods for the examination of water and wastewater. American Public Health Association, 2017.</li> <li>10. R. Vasanthakumari, Practical Microbiology, India: B.I. Publications Pvt. Limited, 2009.</li> <li>11. W. Sattley, M. Madigan, K. Bender, D. Stahl, D. Buckley, Brock Biology of Microorganism, Pearson Education, 2017.</li> </ol>
<b>Course Outcomes:</b>	<p>Upon completion of the course, the student will be able to</p> <ol style="list-style-type: none"> <li>1. Use appropriate media to isolate bacteria from different ecosystems.</li> <li>2. Study and group bacteria on the basis of morphological and biochemical tests.</li> <li>3. Understand the various techniques used for marine sampling.</li> <li>4. Estimate the plankton and the elemental composition in seawater.</li> </ol>