

MMB205: ENVIRONMENTAL MICROBIOLOGY

Teaching Scheme Lectures: 4 hrs/Week Credits: 4	Examination Scheme Class Test -12Marks Teachers Assessment - 6Marks Attendance – 12 Marks End Semester Exam – 70 marks
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Prerequisite: - Microbial Biodiversity, Biochemistry, Microbiology & Industrial Applications.

Course Objectives:

1. To understand the basics of environmental microbiology.
2. To learn the Culture-dependent and culture-independent approaches for understanding microbial diversity in the environment
3. To learn and have complete knowledge of biodegradation.
4. To understand how global warming problem could be solved.

Detailed syllabus

UNIT I

Brief history and development of environmental microbiology: History and development of microbial ecology highlighting significant contributions of microbiologists and emergence of environmental microbiology, and significant applications of microbes in solving environmental pollution problems

UNIT II

Culture-dependent and culture-independent approaches for understanding microbial diversity in the environment: by DNA heterogeneity by reannealing denatured environmental DNA, ARDRA, analysis of FAME profiles, measuring metabolic capabilities using BIOLOG microtitre plates, using DNA probes and PCR primers, G+C analysis, slot-blot hybridization of community DNA, and fluorescent in situ hybridization of intact cells.

UNIT III

Microbial diversity in normal environments: Diversity of microbes in terrestrial (agricultural and desert soils), aquatic (fresh water and marine), atmospheric (stratosphere) and animal (cattle, termites, pests such as cockroach and nematodes, and human being) and their potential applications **Microbial diversity in extreme environments:** Occurrence, diversity, adaptations and potential applications of oligotrophs, thermophiles, psychrophiles, barophiles, organic solvent and radiation tolerants, metallophiles, acidophiles, alkaliphiles and halophiles

UNIT IV

Liquid waste management: Treatment of sewage (Primary, Secondary and Tertiary treatments) and Treatment of Industrial effluents (distillery, textile, pulp and paper). **Solid waste management:** Waste types & their possible usages, landfill development and composting.

UNIT V


Lignin degradation: Lignocellulolytic microorganisms, enzymes and their biotechnological applications in: (i) biopulping, (ii) biobleaching, (iii) textiles (iv) biofuels, (v) animal feed production. Microbes and mineral recovery: **Biobleaching:** of metals like copper, gold and uranium. **Bioremediation of environmental pollutants:** Petroleum hydrocarbons and pesticides. **Global warming:** its causes, effects and remedial measures.


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