



**MANGALORE UNIVERSITY**

**DEPARTMENT OF MICROBIOLOGY**

**MSc Microbiology**

**MBS- 508: Microbial Ecology**

**40h**

**OBJECTIVES**

1. To explore functional ubiquity and diversity of microbes in particular ecosystem
2. Isolation of micro and macro microorganisms, growth, colonization, succession
3. Interaction analysis of microbes with algae, plants, humans, animals
4. Quorum sensing, antibiotic production
5. Natural and engineered microorganisms and their role
6. Applications such as bioremediation, culture collection centers, role in agriculture

**COURSE OUTCOME**

CO1: Concepts of microbial ecology, natural and manmade habitats

CO2: Applications and productivity of microbes in different ecological niches

CO3: Microbial functions in ecosystems, interactions with biotic and abiotic factors

CO4: Understanding microbial habitat and characterization

CO5: Marine ecosystem, Fresh water Ecosystem, Terrestrial Ecosystem,

Extreme Environments

**Unit I**

Concepts of ecology applied to microorganisms; methods in microbial ecology; interactions of microbes with their living and non-living environment; microbial habitats and functions. Roles and regulation of microbes in natural and man-made environments, from cellular to community level. Microbial ecology and environmental microbiology to explore the functional ubiquity and diversity of microorganisms

**Unit II**

Introduction to microbial ecology: overview, motivation, history, applications etc. Auto- and synecology of macro and microorganisms: definitions, terminology, concepts. Individuals and populations: productivity, growth, distribution, activity. Communities: colonization, succession, diversity, structure. Microbial functions in ecosystems and global cycles. Methods in microbial ecology. Habitat characterization

**Unit III**

Interactions of microorganisms with their physical and chemical environment. Microbial guilds and biogeochemical cycles. Interactions with the biotic environment: symbiosis, competition, parasitism, predation. Interactions within microbial communities: quorum sensing, syntrophy, antibiotics. Interactions of microorganisms with algae and plants. Interactions of microorganisms with animals and humans. Ecology of natural and

engineered microbial habitats

#### **Unit IV**

Marine ecosystems: ocean surface, tidal flats, deep-sea, methane seeps, estuaries, anoxic basins. Freshwater ecosystems: lakes, rivers, swamps, bogs, Terrestrial ecosystems: rocks and soil, prairie, forest, tundra, Extreme environments: deserts, hot springs, glaciers, deep subsurface, mine drainage, Landfills, wastewater treatment reactors, bioremediation Culture collections, food ecosystems, agricultural systems, aquaculture.

**Note: Each unit is for 10h**

