

EVPC2005 ENVIRONMENTAL MICROBIOLOGY (3-0-0)

The main objectives of this course are to:

- Understand the role of microbes in biogeochemical processes in different ecosystems.
- Give information about various pollution sources and preventive measures to control pollution.
- Learn in depth of various effluent treatments
- Recognise and use the properties of microorganisms, principally bacteria, to remedy problems of contamination and other environmental impacts.

Module – I : (08 Hrs)

General properties of microorganism: Environmental importance of microorganism, classification, distribution, enumeration of microbes, prokaryotic & Eukaryotic cells. Bacteria: Cell structure, Spore, Morphology and reproductions, Bacteria nutrition, Culture media and culture characteristics, growth of bacteria, batch culture, specific growth rate and doubling time, continuous culture, synchronous growth, effects of environmental factors on growth.

Module – II : (08 Hrs)

Control of microbes: physical and chemical methods, destruction and suppression. Microbial metabolisms: Anabolism and catabolism, Glycolysis, TCA cycle and ETC, Fermentation and anaerobic respiration, Energy balance (ΔGG) -Growth, Substrate Partitioning and theoretical yield, Electron acceptors, Enzyme, Monod and Halden kinetics.

Module – III : (08 Hrs)

Drinking water microbiology: Stream pollution, Water borne diseases and pathogens, MPN test, Faecal coliform and faecal streptococci, MF techniques, IMVIC test. Air microbiology: air borne diseases and pathogens. Soil microbiology: Bio-fertilizer, VAM fungi, N-fixations, Biopesticides, degradation of natural substances. Composting, Bio-energy from waste.

Module – IV : (08 Hrs)

Case studies: Sources of pollution, impact on ecosystem and treatment of following industrial effluents: starch, paper and pulp, tannery, dairy, textile, distillery, oil refineries and pharmaceutical. Significance of ETP, STP, AHU, Bio inactivation plant. Microbes in mining, ore leaching, oil recovery, biopolymers, biosurfactants. Artificial Intelligence in monitoring the environment, species protection, saving energy and efficient agriculture.

Course outcomes

At the end of the course students will be able to:

- Understand the various concepts of ecology
- Aware of biogeochemical cycles – Carbon, Nitrogen, Phosphorus cycles etc. and microbes involved and Capable to assess the quality of water
- Able to analyse solid waste management by various methods and solid waste management by various methods
- Monitor the health status of ecosystems using various advanced techniques

Books

1. Environmental Biotechnology by Alan Scragg. (2005). 11nd edition. Pearson Education Limited, England.
2. Environmental Biotechnology by S.N. Jogdand. (1995). 1st edition. Himalaya Publishing House. Bombay.
3. Microbiology – P.D.Sharma – Rastogi publication Concept of Toxicology – Omkar – Shoban Lal Nagin Chand & Co.
4. Microbiology— Chan etel-McGraw Hill-New Delhi Lehninger Principles of BioChemistry- Nelson & cox