



**MANGALORE UNIVERSITY**  
**DEPARTMENT OF BIOSCIENCES**

**M.Sc. ENVIRONMENTAL SCIENCE**

**ESE 512 WASTE MANAGEMENT**

**39 hrs.**

**Course Outcomes:**

CO1 Discuss about the production of waste from different sources.

CO2 Understand different methods of solid waste management and liquid waste treatment.

CO3 Understand emission standards.

CO4 Study utilization of waste after management.

**UNIT I (13 hours)**

Waste: Introduction. Classification - Solid waste and liquid waste; Solid waste - Definition, classification and components; Municipal, industrial, domestic, hazardous waste, biomedical waste; environmental standards-emission standards, drinking water standards, Effects of solid waste on environment, physical and chemical properties of solid waste.

**UNIT II (13 hours)**

Liquid waste: Sewage and effluents, effect of liquid waste on environmental components. Microbiological treatment of solid wastes – composting, land farming, bioreactors. Physical, chemical and biological treatment of liquid waste. Disposal of radioactive, pharmaceutical, refinery and leather waste.

**UNIT III (13 hours)**

Treatment of solid and liquid waste: Solid waste Management. Biological treatment of liquid wastes - aerobic and anaerobic treatment of sewage and effluents. Waste management and utilization of plantation crop wastes, aquatic weeds, kitchen, garden and poultry waste. Recycling and reuse of solid and liquid wastes.

**References:**

1. Agrawal, K.C., 2001. Fundamentals of Environmental Biology, Nidhi Publishers, Bikaner, India.
2. Hosetti, B.B. and Arvind Kumar, 1998. Environmental Impact Assessment and Management, Daya Publishing House, Delhi.
3. John Arundel, Sewage and Industrial Effluent Treatment, Blackwell Science Publishers.
4. Metcalf and Eddy, Waste Water Engineering, McGraw-Hill International.
5. Diwakar Rao, P.L. 1990. Pollution control Hand book, Utility Publications Ltd., Secunderabad. India.
6. Moriarty, F., 1975. Pollutants and animals; A factual perspective. George Allan & Unwin Ltd., London.
7. Schmitz, R.J, 1996. Introduction to water pollution biology. Asian Books Pvt. Ltd., New Delhi