

BTC DSC 452T
ECOLOGY AND ENVIRONMENT MANAGEMENT

Contact Hours: 45

Full Marks = 100 [ESE (70) CCA (30)]

Course Objectives: *This course aims to provide students with a comprehensive understanding of environmental science and biotechnology, focusing on the principles governing our environment, energy flow in ecosystems, pollution sources, and sustainable bioprocessing. By the end of this course, students will be equipped with the knowledge and skills needed to analyze environmental challenges critically and apply biotechnological solutions.*

UNIT 1 (8 Lectures)

Our Environment: introduction to atmosphere, hydrosphere and lithosphere; principles and concepts of ecosystem; structure of ecosystem; strata of an ecosystem; types of ecosystem including habitats; cybernetics and homeostasis.

UNIT 2 (9 Lectures)

Energy transfer in an Ecosystem: food chain; food web; energy budget; production and decomposition in a system; ecological efficiencies; trophic structure & energy pyramids; ecological energetic; principles pertaining to limiting factors; bio-geochemical cycles (N, C, P cycles).

UNIT 3 (10 Lectures)

Pollution and environmental health: sources and causes of pollution; human health impacts and ecological impacts of pollution; detection of environmental pollutants; pollution control and mitigation strategies. **Xenobiotics and Pollutants:** definition and classification; sources of xenobiotics; emerging contaminants; impact of xenobiotics on ecosystems and biodiversity; human exposure and health effects.

UNIT 4 (10 Lectures)

Microbial fuel cell (MFC): principle and general components of MFC; types of MFC – single double and triple chambered; factors affecting MFC performance; application of MFC. **Biofuel:** definition and generation of biofuels; role of biotechnology in biofuel generation; potential of algae in biofuel generation; examples and uses of industrially produced biofuels; challenges in biofuel generation.

UNIT 5 (8 Lectures)

Sustainable bioprocessing: green biotechnology and sustainability; technique of waste-to-energy generation; introduction to nanoparticles-based approaches in waste management and bioenergy production; applications in bioremediation and environmental applications.

Course Outcomes: *By the end of this course, students will understand ecosystems, energy transfer, pollution sources and control, and the impact of xenobiotics on the environment and human health. They will also be familiar with biotechnological solutions for environmental challenges, including microbial fuel cells, biofuels, and sustainable waste management. This knowledge will enable them to address real-world environmental issues effectively.*

SUGGESTED READING

1. Newman, E. I. (2008). Applied Ecology and Environmental Management. Germany: Wiley.
2. Sulphery, M. M., Safeer, M. M. (2014). Introduction To Environment Management. India: Phi Learning.
3. Mukherjee, B. (2000). Environmental Management: Basics and Applied Aspects of Management of Ecological and Environmental Systems. India: Vikas Publishing House.
4. Barrow, C. (2006). Environmental Management for Sustainable Development. United Kingdom: Taylor & Francis.
5. Dash, M. C. (2013). Concepts of Environmental Management for Sustainable Development. India: I.K. International Publishing House Pvt. Limited.
6. Barrow, C. J. (2005). Environmental Management and Development. United Kingdom: Routledge.