

URBAN ECOLOGY AND POLLUTION ABATEMENT TECHNOLOGIES

Programme Director	Dr.Sabitha Thomas, M.Sc., M.Phil., Ph.D., getsabitharose@gmail.com ,
Name of the Department	Department of Zoology
Course title	Urban ecology and Pollution abatement technologies
Duration of the course	90 hours (3 Credits)
Course fee	Rs. 3700/-
Eligibility of the candidate	Undergraduate student of any discipline

SCOPE OF THE COURSE

Objectives

Introduces students to social scientific thinking on cities and helps them to critically analyze the pros and cons of urbanisation; makes them to evaluate various approaches to urban policy, will examine different crises confronting cities in the 21st century. The study aims at creating awareness among student community by educating them about pollution and its ill effects and how to mitigate it through sustainable development.

Learning outcomes

- Awareness, thorough knowledge and understanding about recent scientific methods for the conservation of nature, alternate energy sources & pollution control technologies.
- Students should be able to have clear-cut idea about the prevailing rules, regulations and policies for sustainable development and environmental conservation strategies.
- Students should be able to understand various methods of analysing, estimating and quantifying pollutants.
- Students should be able to utilize technologies on clean energy to have a sustainable ecosystem for wellbeing.

SYLLABUS

COURSE CONTENT: Theory, Practice & Analysis (modules):**90 hours**

Module 1: SCOPE OF ECOLOGY (2 hours)

History of ecology, origin, objectives and scope of ecology, sub-divisions of ecology, modern agricultural environment.

Module 2: CONSERVATION BIOLOGY (13 hours)

Natural resources-Energy, water, land and soil, mineral and organism resources-Approaches to management. Global climate and environmental change, habitat fragmentation, invasive species, buffer zones.Global Environmental Issues, renewable energy, alternative fuels, advanced energy conversion and storage systems.

Science and Technology of Nuclear Energy: Fission and Fusion, Solar Energy Conversionclimate, environment, ecosystems, policy and economic assessments of carbon capture and storage technology.EIA, Environmental audit, wealth from wastes.

Conservation strategies-Project tiger, Biosphere reserves.

Field observation & Analysis: Ecological adaptations of animals in urban ecosystems

a) Feeding behavior of sparrows/crows/cows in an urban ecosystem.

b) Animal behavior-Monkeys

c) Nest making-Birds, honey bees and wasps on buildings

Module3: ECOLOGY OF AN URBAN ECOSYSTEM (6 hours)

Components of urban ecosystem, structure and function of ecosystem, energy flow and mineral cycling, spatial heterogeneity.Examples of urban ecosystems-terrace garden, vertical garden etc.

Practice& Analysis: Terrace gardening and vertical gardening

Field visit to a garden-observation on behavioral adaptation of animals.

Module 4: URBAN BIODIVERSITY (17 hours)

Urbanization, population density and impact on ecosystem, Industrial melanism, sustainable development-concept and strategies. Biodiversity-changes and management approaches. Global prospects towards environmental ethics and sustainable development.

Field observation & analysis:Ecoplanning of an urban area and environmental action plan.

Module 5: POLLUTION AND GLOBAL ENVIRONMENTAL CHANGES (16 hours)

Classification of pollutants, types of pollution-Air, water, soil, noise, , thermal &radioactivepollution. Solid wastes, biomedical wastes.Hazardous waste treatment and solid waste management, occupational health, LC50 and LD 50 values of toxicants.Solid waste management and energy recovery.

Acid rain, global warming, greenhouse effect.

Field observation & analysis: Risk assessment study in various commercial sites: malls, petrol pumps, offices, welding shops (EIA).

Safety practices in hospitals/nursing homes.

Module 6: ENVIRONMENTAL POLICIES, REGULATIONS & STRATEGIES

(12 hours)

Global environmental changes-monitoring and documentation- Acts and protocols-Montreal, kyoto, Cartagena, IPCC, Earth Summit etc. Ramsar convention, Stockholm convention, Basel convention.

Module 7: POLLUTION ABATEMENT TECHNOLOGIES

(18 hours)

Biotechnology, toxicology and environmental management-genetically engineered microbes in biotreatment of waste and environment, biosorption of metals, biopolymers and bioplastics, biofuels, bioleaching, biofertilizers and biopesticides.

Fermentation technology, vermiculture technology, hydroponics in wastewater management, degradation of xenobiotics, nanotechnology in water treatment, water shed management, rainwater harvesting, recycling in packaging industry.

Module 8: Discussion and case study

(6 hours)

- a) Satyavan V AP Pollution board AIR 1993 AP 257
- b) Mahavir soap and Godakhu Factory V Union of India AIR 1995 Ori 218
- c) UP pollution control board VMP Modi distillery and other, AIR 1998 Sc 1128
- d) The Bhopal gas disaster case UCC vs UOI MPLJ(1988)540, AIR 1992SC 248
- e) Ganga water pollution MC Mehtha V/S Union of India Sec 47, April 1988 SC AIR 273
- f) Case study on overpolluted cities
- g) Discussion on managing the carbon footprint

Project and evaluation

Assignments