

**Introduction:**

Environmental Biology encompasses varied themes such as energy flow biosphere & biomes, carbon trading and other biogeochemical cycling, greenhouse gas emissions, water resource management, land degradation and rehabilitation, flora and fauna, habitat destruction, deforestation, energy and mineral depletion, air and water pollution, soil erosion, and groundwater contamination. This course provides insight into of the basic science of environmental biology and ecological theory. Environmental Biology helps in recognition of environmental problems such as climate change, global warming, ozone layer depletion, acid rains as well.

**Course Objectives:**

The main learning goals students will all accomplish by the end of the semester are

- To summarize our ecological understanding of environmental problems
- List environmental problems that are the result of unsustainable human behavior and explain the root causes of environmental problems
- Explain how human health is related to environmental health
- Summarize changes in economics, policy, and education that promote sustainability

**Course Learning Outcomes:**

Upon successful completion of the course, the student will be able to:

1. Understand and apply the basic concepts of Environmental biology
2. Acquire theoretical knowledge for rehabilitation of destroyed ecosystems and habitats in the environment.
3. Solve the ecological Problems and their management through scientific approach

**Course Contents:**

1. **Environmental Pollution:** Primary and secondary pollutants, point and non-point source pollutants, Air Pollution sources: Origin, dispersion. Impact of air pollutants viz. Sulphur oxides; Nitrogen oxides and Volatile organic compounds; Carbon oxides, Ozone, Smog. NH<sub>3</sub>, PAN, PAH, smoke, water vapors, pollen grains and fungal spores on human crops and forest; MTBE (methyl tertiary butyl ether) and CFCs (chlorofluorocarbons); Noise pollution; sources, units, health damage from noise, control of noise; Water pollution; Sources of water pollutants; Composition

- and properties of water pollutants, Fate of water pollutants; Domestic and industrial effluents; Heavy metals and their impact on aquatic life; Water purification in nature; Waste water treatment plants; Wetland sewage treatment plants; cleaner, cheaper, and prettier water; Land Pollution; Pesticides (pollutants made to kill); Inorganic pesticides; Synthetic organic pesticides; Biochemicals (bacterial toxins and synthetic hormones); Chemical pesticides (non-target toxicity); Chlorine, dioxin and PCBs (polychlorinated biphenyls); Advantages and disadvantages of pesticides; Thermal pollution, global warming;; Warm water drainage from nuclear reactor; Radioactive pollution; Radiations, unites, types, causative effects and leakage from nuclear reactor
2. **Population Ecology of man:** Environmental management; Ecocrises; Environmental laws; Environmental ethics and politics; Environmental Economics; Chemical and biological warfare, Towards an applied Human Ecology
  3. **Contemporary environmental themes:** Ozone depletion; Greenhouse gases and their effects; Acid rain; Desertification; Deforestation, Range management
  4. **Radiation Ecology:** Remote Sensing as a tool for sturdy and Management of Ecosystem

### Teaching-Learning Strategies

Teaching will be a combination of class lectures, class discussions, and group work. Short videos /films will be shown on occasion.

### Assignments

The sessional work will be a combination of written assignments, class quizzes, presentation, and class participation/attendance.

### Assessments and Examination

Sessional Work:	25 marks
Midterm Exam:	35 marks
Final term Exam:	40 marks

### Books Recommended:

1. M.L. McKinney. 2019. **Environmental Science: System and Solution**. 6<sup>th</sup> Edition. Jones and Bartlett Publication, Boston, USA
2. G. Tyler Miller, Jr. 2016 19<sup>th</sup> Ed. **Living in the Environment. Principles, Connections and Solutions**. Book/Cole Thomson Learning, USA
3. Peter Stilling, 2016. **Ecology**. 4<sup>th</sup> Edition. Prentice Hall Publication, New Jersey, USA
4. Krebs. 2016. 6<sup>th</sup> Ed. **Ecology: The experimental analysis of distribution and application**.
5. J.L. Chapman and M.J. Reiss, 1997. **Ecology**. Cambridge University Press, UK.
6. M.C. Molles. 2016 7<sup>th</sup> Ed. **Ecology: Concepts and applications**. WCB/McGraw Hill, New Yorks
7. C.E. Mason. 2002. **Biology of Freshwater Pollution**. Longman Publication, UK
8. E.P. Odum. 1996. **Ecology: A Bridge between science and society**.
9. R.K. Singh. 1998. **Human Ecology**.
10. R. Lloyd. 1992. **Pollution and Freshwater**. Fishing News Books
11. Smith, 2001 6<sup>th</sup> Ed. **Ecology and Field Biology**. National Book Foundation, Islamabad.
12. E. P. Odum. 2005 5<sup>th</sup> Ed. **Fundamentals of Ecology**. National Book Foundation, Islamabad.

## Z-4802 Environmental Biology-II (Lab.)

Cr: (1)

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## **Course Contents:**

1. Measurement of pollutants levels; In atmosphere (NO<sub>2</sub>, SO<sub>2</sub>, O<sub>3</sub> and comparison with rural air); In soil (toxic chemical, fertilizer, insecticides, pesticides, herbicides); In plants and animals;
2. Analysis of polluted and freshwater for various pollutants like heavy metals, DO, CO<sub>2</sub>, Chloride, -CO<sub>3</sub>, -HCO<sub>3</sub>, BOD, COD, pH, EC, total soluble and suspended solids, total acidity;
3. Impact of radiation on microbes and plants
4. Effects of noise on animal behavior
5. Field visit for selected aquatic ecosystem and writing notes

## **Teaching-Learning Strategies**

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## **Assignments**

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