Bot-405 & 406 ENVIRONMENTAL BIOLOGY Credit Hours: 3(2+1)

THEORY

Introduction of the Course:

This course provides an introduction to the basic principles of environmental biology, ecology, and the relationship between humans and the natural world. This course will provide students with a broad survey of environmental science with emphasis on current events, global and international issues.

Course Objectives:

The course is designed to:

1. include different aspects of environmental pollution in order to understand its nature and impact on the living organisms
2. Analyze current environmental issues and evaluate potential solutions
3. Relate the features of human populations to different types of environmental degradation
4. Recognize the impact of globalization on the environment

Course Details:

5. **Introduction:** Aim and scope. An interdisciplinary field.
6. **Natural Resources:**
   - **2.1.** Nature, Importance and conservation of the following, Energy, Water, Land, Minerals, Agriculture, Forestry, Range Land, Wild-Life and Aquaculture

3. Air Pollution:

- **3.1.** Sources, Nature and impact of primary and secondary air pollution
- **3.2.** Effect of major and minor phytotoxic air pollutions on plants
- **3.3.** Prevention and Control (vehicles pollution and Industrial chimney wastes)

4. Water Pollution:

- **4.1.** Introduction, sources of water pollution, nature of water pollution
- **4.2.** Ground water and marine pollution impacts of water pollution
- **4.3.** Prevention and control measures.

5. Radiation Pollution:

- **5.1.** Nuclear concepts and terminology, sources, types
- **5.2.** Comparative radiation sensitivity of organisms, Radiation, Effects at cell organisms and ecosystem levels
- **5.3.** Fate of Radio-nuclides in the environment
- **5.4.** The Fall out Problem
- **5.5.** Nuclear waste disposal

6. Solid Waste, Noise and thermal pollution:

- **6.1.** Nature sources, impacts and control

7. Pesticides and Agro-Chemicals:

- **7.1.** Herlucides, Insecticides and Fungicides as plant poisons, characteristics, Environmental concerns and impact of pesticides Ecosystem.

8. Environmental Crisis:

- **8.1.** Nature origin, Impact and control of Ozone hole
- **8.2.** Green house effects
- **8.3.** Global Warming
- **8.4.** Acid rays chemical and Biological warfare

Practicals:

1. Examination of Industrial Waste Water and Municipal Sewage for some physical characteristic and

i. Total Dissolved Solids (TDS)
ii. pH and EC
iii. BOD and COD , DO
iv. Chlorides, Carbonates, Bicarbonates and Nitrates

2. Examination of Water Samples from different sites for the Presence and Diversity of Organisms.
3. Field observation on the Sources and Impacts of various Air Pollutants.
4. Examination of the Effects of Automobile Exhaust on the Adjacent Vegetation.

i) Chlorophyll Content
ii) Symptoms / Soot and Particulate matter

5. A visit to EPA to study the Instruments used for Monitoring Pollution.
6. A visit to the Industrial Organizations to examine their Effluent Treatment System.
2. A visit to the municipal Organization to study their Sewage Treatment System.
8. Irradiation of seeds / Effects of seed irradiation on seed germination and early seedling grow

Teaching-learning Strategies

1. Lectures
2. Group Discussion
3. Laboratory work
4. Seminar/ Workshop

Learning Outcome:

1. Describe and debate various global and regional environmental concerns that affect various forms of life.
2. Appreciate the impact of human activities on other life and the environment.
3. Investigate specific cases of environmental pollution or natural challenges, and their impacts.
4. Apply chemistry, biology, molecular biology and microbiology skills to environment issues.
5. Reflect on the scientific concerns, including ethical and social issues, to the environment associated with the applications of new technologies.

Assessment Strategies:

1. Lecture Based Examination (Objective and Subjective)
2. Assignments
3. Class discussion
4. Quiz
5. Tests

Recommended Readings:

1. Berry, W.K. (2017). *Water Pollution* CBS Publisher and Distributer Pvt. Ltd.
2. Goel, P. K. (2016). *Water Pollution: Causes, Effects and Control* (Revised 2nd edition) new AGE International Ltd Publisher.
3. Ghafoor, A., Murtaza, G. M., Rehman, Z., Sabir, M. Ahmad, H. R. and Saifullah. (2012). *Environmental Pollution*: *Types, Sources & Management*. Allied Book Centre, Urdu Bazar, Lahore.
4. Treshow, M. (Latest Edition) *Environment and Plant Response*. Mcgraw-Hill NY.

5. Koziol, M.J., Whatley, F. R. (Latest Edition) *Gaseous Air Pollution and Plant Metabolism.* Butterworths.
6. Agrawal, K. C. (Latest Edition) *Environmental Biology* Agro Botanical Publishers, India.
7. Johnson, C. E. (Latest Edition) *Eco-crisis* John Wiley & Sons. Inc., New York, London. Toronto.
8. Mansfield, T. A. (Latest Edition) *Effects of Air Pollutants on Plants* Cambridge University Press, London, New York, Melbourne.

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