

Course – Plan

School : School of Science

Department : Environmental Science

Course Code : ES 578

Course Title : Environmental Pollution

L3-T0-P0-CR3

Instructor(s): Prof. Kali Prasad Sarma, Dr. Santa Kalita, Dr. Pratibha Deka

Abstract: This course is intended to introduce the students to pollution and its effects on biological organisms; how they respond to environmental pollution and behaviour changes that occur. It also aims to create in the students an appreciation of the importance of pollution in environmental and social development; realise the hazards of pesticides and alternative biological methods to control them thereby, reducing the effects of environmental pollution.

Course objectives:

- 1) To study the effects of environmental pollution on biological systems
- 2) To study the methods involved to study pollution
- 3) To study environmental techniques to reduce pollution on biological systems

Scope: This course is intended to introduce the students to pollution and its effects on biological organisms; how they respond to environmental pollution and behavior changes that occur. It also aims to create in the students an appreciation of the importance of pollution in the context of environmental and social development; realize the hazards of pesticides and alternative biological methods to control them thereby, reducing the effects of environmental pollution.

Prerequisite knowledge or background level assumed: Basic understanding about environment, ecology, biology and chemistry.

Course outline:

Unit – 1

Definition and concepts; Scope of Environmental Pollution; Issues and risks

Unit – 2

Pollutants; Pesticide residues: causes and effects; Bioaccumulation; Tolerance ranges

Air Pollution: Responses of plants and animals, Biomonitoring of air pollution [by lichens (*Lobaria pulmonaria*), animals (frogs and toads) and insects (honey bees, stone-flies)].

Water pollution: Responses of plants and animals to changes in physio-chemical characteristics of water; their distribution in relation to water pollution; Biological monitoring of pollution in water.

Soil pollution: Responses of plants and animals to soil pollution.

Unit - 3

Effect of anthropogenic pollutants and climate change on animal behavior:

Aggression and Personality;

Learning and Communication;

Evolution of mating systems and reproduction;

Predator-prey interactions.

Unit - 4

Control of pollution through Biological agents:

Air pollution: its control through biological agents

Water pollution: control through biological agents

Soil Pollution: control through biological agents

Use of botanicals in control of pests and diseases

Text Books:

Roy. M. Harrison Pollution, Causes, Effects and Control (4th Edition, 2001 or the latest edition)

Jamil Kaiser, Bioindicators and Biomarkers of Environmental Pollution and Risk Assessment (Science Publishers, 2001 or the latest edition)

Marquita K. Hill, Understanding Environmental Pollution (Cambridge University Press 2010 or the latest edition)

K. Paranjape, V. Gowariker, V. N. Krishnamurthy, S. Gowariker, Pesticide Encyclopedia (CABI Publishing, 2015 or the latest edition)

References:

Odum. E. P., Fundamentals of Ecology, Natraj Publisher, Dehradun 1996 or the latest edition.

Pedagogy: Lecture, Presentation, Assignment, Discussion

Time plan of the course:

Topic	No. of classes
Definition and concepts; Scope of Environmental Pollution; Issues and risks	4
Pollutants; Pesticide residues: causes and effects; Bioaccumulation; Tolerance ranges	4
Air Pollution: Responses of plants and animals, Biomonitoring of air pollution [by lichens (<i>Lobaria pulmonaria</i>), animals (frogs and toads) and insects (honey bees, stone-flies)]	6

Water pollution: Responses of plants and animals to changes in physio-chemical characteristics of water; their distribution in relation to water pollution; Biological monitoring of pollution in water.	6
Soil pollution: Responses of plants and animals to soil pollution.	4
Effect of anthropogenic pollutants and climate change on animal behavior: Aggression and Personality; Learning and Communication; Evolution of mating systems and reproduction; Predator-prey interactions.	8
Control of pollution through Biological agents: Air pollution: its control through biological agents Water pollution: control through biological agents Soil Pollution: control through biological agents	6
Use of botanicals in control of pests and diseases	2
Total number of classes	40

Evaluation scheme: Performance of student is evaluated based on continuous assessment

Test 1 (written): 25 marks

Test 2 (midterm, written): 40 marks

Test 3 (written/ assignment /quiz /seminar): 25 marks

Test 4 (end term, written): 60 marks

Total: 150 marks

Evaluation components: Written test, Assignments, group discussion

Expected outcomes: It is expected that at the end of the course, the students will be able to apply the knowledge to understand issues relating to the problems of pollution and its impacts and find practical ways for its management.

Course Co-ordinator

(Santa Kalita)