COURSE TITLE: ADVANCE BOTANY-I (ENVIRONMENTAL BIOLOGY)

CREDIT HOURS: 3

Syllabus Outline: Study of Environmental Factors and Pollutants with relation to Bio life.

Course Outline:

Introduction: Aim and Scope, Interdisciplinary Approach.

Natural Resources: Nature and Conservation of the following: Energy, Water, -Mineral and Land Resources. Agriculture, Forestry, Range Land, Wild Life and Aquaculture.

Environmental Pollution: Nature and Classification.

Air Pollution: Sources and Effects of Pollutants on Plant Growth viz; Fluoride, Sulphur dioxide (S02), Ozone, Pan + Smog, Ammonia, Chlorine, Ethylene, Dusts etc.. Nature, Causes, Prevention and Control of Air Pollution (Vehicular Pollution and Industrial Chimney Wastes).

Water Pollution: Sources of Water Pollution, Nature of Pollutants. Ground Water and Marine Pollution, Impacts of Water Pollution, Prevention of Water Pollution.

Radiation Pollution: Nuclear Concepts and Terminology, Comparative Radiosensitivity of Organisms, Radiation Effects at Ecosystem level. Fate of radio-nuclides in the environment. The Fall Out Problem, Nuclear Waste Disposal. Sources, Nature and Impacts of Solid Waste Pollution, Noise and Thermal Pollution.

Pesticides and Agro-Chemicals: Herbicides, Insecticides and Fungicides as Plant Poisons and their Impact on Ecosystem.

Environmental Crisis: Major Courses and Solutions, Ozone Hole, Green House Effect, Acid Rains, Chemical and Biological Warfare.

Biodiversity and Conservation: Evaluation, Criteria and Values; Inventory and Measuring of Biodiversity; In-situ and Ex-situ Conservation of Plants.

Module Aims: Completion of this program will produce a working knowledge of ecological sampling, analysis and interpretation of biological data and prepare graduates to study and resolve the ecological consequences of environmental problems.

Learning Strategies:

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

Learning Outcome:

The students will acquire knowledge about the hazardous effects of different Environmental Pollutants and Relative Measures for their Control/Prevention.

Evaluation Criteria

Examination	Type	Marks
Internal Examination	Sessional Work	15%
	Mid-Semester	25%
External Examination	Final Semester	60%

Books Recommended:

1. Koziol, M.J. and Whatley, F.R. (2009). Gaseous Air Pollution and Plant Metabolism. Butterworths. U.K.

2. Goodstein, E.S. (2008). Economics and the Environment. Prentice Hall Publishers. New Jersey.

3. Mitsa, W.J. and Gosselink, A. (2007). Wetlands. Johan Wiley and Sons, me. New York.

4. Simmons, I.G. (1981). The Ecology of Natural Resources. Edward Arnold.

5. Emery, M. (2005). Promoting nature in cities and towns.

6. Varshney, C.K. (2005). Water Pollution and Management, Wiley Eastern Limited.

7. Johnson, C.E. (2004) Eco-Crisis. John Wiley and Sons. me.. New York.

8. Agrawal, K.C. (2001). Environmental Biology, Agro Botanical Publishers, India.

9. Chhatwal, D.R., Mehra, M.C., Satake, M., Katyal, T., Katyal, M. and Nagahiro. T. (2001). Encyclopedia of Environmental Pollution and its Control. (6 Vols.), Anmol Publication, New Delhi, India.

10. Moriarty, F. (2001) Ecotoncology. Acadmeic Press Inc.

11. Nobel, B.J. and Kormond, Y. (2001). Environmental Science. Prentice Hall Inc. New Jersey. USA.

12. Treshow, M. (2001) Environment and Plant Response. McGraw Hill New York.

13. Usher, M. (2001). Widllife Conservation Evaluation. Chapman and Hall.

14. Rao, D.N., Ahmad, K.J., Younas, and Singh, S.N. (2000). Perspectives in Environmental Botany (Vol. I,) Print House, Lucknow, India.

15. Smith, L. and Graham, A. (2000). Impact Assessment and Sustainable Resource Management. John Wiley and Sons, New York.

16. Jeffrey, A.M. (1999). Economics and Biological diversity. International union for conservation of Nature and Natural Resources in Gland, Switzerland.

17. Owen, O.S. (1999) Natural Resources Conservation - An Ecological Approach. MacMilian Co., New York.

18. Southwick, C.H. (1997). Global Ecology, Sinauer Associates Inc. Sunderland, Massachusetts. USA.

19. Mansfield, T.A. (1990). Effect of Air Pollutants on plants. Cambridge University Press, London, New York, Melbourne.

20. Duffey, E. (1980). The Conservation of Nature, McGraw Hill Book Company, New York.

21. Odum, E.P. (1971) Fundamentals of Ecology. W.B. Saunders Company, Philadelphia, PA.

TITLE: ADVANCE BOTANY-LAB-I (ENVIRONMENTAL BIOLOGY)

CREDIT HOURS: 1

Module Aims: Completion of this program will produce a working knowledge of Ecological Sampling, Analysis and Interpretation of Biological Data and prepare graduates to study and resolve the Ecological Consequences of Environmental Problems.

Learning Outcome: The students will acquire knowledge about the Hazardous Effects of different Environmental Pollutants and the Measures for their Control/Prevention by using different Laboratory Techniques.

Syllabus Outline: The course include different laboratory techniques used for soil and water analysis from industrial waste and visit to different industries. Course Outline:

1. Examination of Industrial Waste Water and Municipal Sewage for

i) Total Dissolved Solids (IDS)

ii) pH and EC

iii) BOD and COD

iv) Chlorides, Carbonates, Bicarbonates and Nitrates.

2. Examination of Water Samples from different sites for the Presence and Diversity of Organisms.

3. Examination of the Effects of Automobile Exhaust on the Adjacent Vegetation.

i) Lead Count

ii) Chlorophyll Content

iii) Symptoms

iv) Soot and Particulate Matter.

4. A visit to EPA to study the Instruments used for Monitoring Pollution.

5. A visit to the Industrial Organizations to examine their Effluent Treatment System.

6. A visit to the municipal Organization to study their Sewage Treatment System.

7. A Study Tour to a National Park and a wetland site to evaluate attributes criteria and values of the area concerned.

8. Irradiation of Seeds and study of the Effects of Seed Irradiation on Seed Germination, Growth and Yield of plants.

9. Field observation on the Sources and Impacts of various Air Pollutants.

Evaluation Criteria

Examination	Type	Marks
Internal Examination	Sessional Work	15%
	Mid-Semester	25%
External Examination	Final Semester	60%

Books Recommended:

1. Koziol, MJ. and Whatley, F.R. (2009). *Gaseous Air Pollution and Plant Metabolism.* Butterworths. Londan.

2. Goodstein, E.S. (2008). *Economics and the Environment.* Prentice Hall Publishers, New Jersey.

3. Varshney, C.K. (2005). *Water Pollution and Management,* Wiley Eastern Limited.

4. Chhatwal, D.R., Mehra, M.C., Satake, M., Katyal, T., Katyal, M. and Nagahiro. T. (2001). *Encyclopedia of Environmental Pollution and its control. (6 vols.),* Anmol Publication, New Delhi, India.

5. Mansfield, T.A. (1990). *Effects of Air Pollutants on Plants.* Cambridge University Press, London, New York, Melbourne.

6. Odum, E.P. (1971) *Fundamentals of Ecology.* W.B. Saunders Company, Philadelphia.