

**Punyashlok Ahilyadevi Holkar Solapur University, Solapur**



**Name of the Faculty: Science & Technology**

**CHOICE BASED CREDIT SYSTEM**

**Syllabus: Environmental Science (GE)**

**Name of the Course: B.Sc. I Sem. I & II (Liberal Science)  
(Syllabus to be implemented from June 2022)**



## **Punyashlok Ahilyadevi Holkar Solapur University, Solapur**

### **B. Sc. First Year (Liberal Science) Semester-I**

#### **GENERIC ELECTIVE: ENVIRONMENTAL SCIENCE**

#### **Teaching Scheme:**

**Lectures – 3 Hours/week, 2 Credits**

**Practical – 4 Hours/week, 4 Credits**

#### **Examination Scheme:**

**UA – 40 Marks**

**CIE – 10 Marks**

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#### **About Course:**

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The objective of any programme at Higher Education Institute is to prepare their students for the society at large. The PAH Solapur University envisions all its programs in the best interest of their students and in this endeavor it offers a new vision to all its Under-Graduate courses. It imbibes a Learning Outcome-based Curriculum Framework (LOCF) for all its Under Graduate programs.

The LOCF approach is envisioned to provide a focused, outcome-based syllabus at the undergraduate level with an agenda to structure the teaching-learning experiences in a more student-centric manner. The LOCF approach has been adopted to strengthen students' experiences as they engage themselves in the programme of their choice. The Under-Graduate Programme will prepare the students for both, academia and employability.

Each programmer vividly elaborates its nature and promises the outcomes that are to be accomplished by studying the courses. The programs also state the attributes that it offers to inculcate at the graduation level. The graduate attributes encompass values related to well-being, emotional stability, critical thinking, social justice and also skills for employability. In short, each programme prepares students for sustainability and life-long learning.

Environmental Science with its multidisciplinary nature and holistic approach mostly focuses on conservation and management aspects which help for survival of life on earth by understanding and tackling various problems that deteriorate the quality of the environment. Understanding about Environmental Science is becoming ever more necessary for every person

and it is responsibility of all to protect, conserve and restore the quality of our environment by using scientific knowledge.

The new curriculum of B.Sc. (Hons) ENVIRONMENTAL SCIENCE offer essential knowledge and technical skills to study Our Environment in a holistic manner. Students would be trained in all specialized areas of Environmental Science using a unique combination of core and elective papers with significant inter-disciplinary components. Students would be exposed to cutting-edge technologies that are currently used in the study of Earth and Environment, Biotic and Abiotic factors, evolution of flora and fauna and interactions with each other within the ecosystem, needs of biodiversity conservation and advanced technics used in the field of environment. Students would also become aware of the social and environmental significance of wildlife, plants, and their relevance to the national economy.

#### **Scope and Importance:**

Environmental Science is broad based and it encompasses a large number of area and major aspects such as Natural Recourses, Ecology and Biodiversity, Environmental pollution and control and Global environmental problems like pollution, climate change, health issues etc. Environmental awareness and education, Environmental legislation and Energy crises.

Applicants wishing to continue their environmental studies might study M.Sc.in Environmental Science further. During this course, candidates acquire environmental science knowledge and abilities. After the training, graduates may have further chances with large income packages from the private, public and government sectors.

B.Sc. (Hons.) Professional environmentalists can work in specific positions offered by top organizations such as environmental consultant, recycling officer, waste management officer, environmental education officer, marine biologist, sustainability consultant, nature conservation agents, transport planner, wildlife cinematographers, etc. Environmental Science professionals can take-up specific roles in same field. Fresher's can earn on average INR 20K - 2 Lakhs per month, and up to INR 2, - 20LPA can be obtained with expertise.

- 1) **Introduction:** This course includes Generic Electives four papers Paper I: Ecological factors and Ecological Relationship Paper II: Climatology and Meteorology Paper III: Atmospheric Chemistry and Management & Paper IV: Introduction of Water and Soil Chemistry. Each paper consists of two units. All these papers help students to improve their basic knowledge about Ecological factors,

interrelationships, various climatological concepts, issues, meteorological parameters, monitoring, atmospheric chemistry, soil chemistry and their management.

- 2) **Advantages of Course:** All these papers will be helpful to improve their skills in environmental field. Practical based papers will be helpful to develop their research and innovative skills & understanding of all the basic loopholes. These papers act as baseline to their next year studies.

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**Course Prerequisite:**

Student shall have knowledge of Environmental Science

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**Preamble****Course Objectives:**

Objectives of the Course: To get the knowledge about surrounding environment includes life on various spheres, studies of environmental segments i.e. Lithosphere, Hydrosphere, Atmosphere and Biosphere characters, structure, and environmental importance. Knowledge about biodiversity includes the forms, size, types, and diversity of bacteria, fungi, parasites, viruses, pathogens, classification, and importance. To get the knowledge about introduction, components of ecosystem, ecological pyramids with food chain and food webs, about the ecological succession, To get knowledge about different concepts in taxonomy understand different classification systems and its merit & demerits, understand identification methods To get the detailed knowledge about characters, environmental pollution, pollutants, sources, causes, effects, control measures with case studies. To get the knowledge about structure, composition, and importance of lithosphere, hydrosphere, atmosphere. To get the knowledge about industrial pollution, municipal solid waste management and urban and rural environmental issues. To get the knowledge concept, types, examples, case studies of accidents, hazards and disasters.

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**Course Outcomes:**

1. Fascinating world of Environment and Environmental issues.
2. Hands on Training will help students learn use of environmental equipment's, and instruments, laboratory analysis for the study and solve the environmental problem.
3. Making environment friendly designs, flow diagrams in Practical Records will enhance understanding about environmental issues / problem.
4. Use of Illustrations, Photographs, Charts, Permanent Slides, Museum and Herbarium

Specimens along with ICT Methods will provide an interesting insight into the beautiful world of flora and fauna.

5. Ecology and Biodiversity conservation includes Medicinal field, Industry, Agriculture, Research and Study, Job Opportunities and Environmental Conservation. This paper is both informative and interesting and will enable students to learn about Biodiversity not only as a plant or nature lover, but also for higher academic pursuits, particularly in the field of Biological Sciences, Environment and Biodiversity Conservation.
  6. Understanding of evolution earth and environment, composition, properties and important species in the each sphere.
  7. Contemporary approaches in wastewater treatment and environmental biotechnology.
  8. Understand about need of EIA and Environmental Audit in environmental management.
  9. Know about environmental laws, acts, policies, rules and important circular's or notices.
  10. Know about design of bioreactors, factors affecting growth and production
  11. Comprehend the techniques and the underlying principles in upstream and down- stream processing
  12. Learn the occurrence, abundance and distribution of microorganism in the environment and their role in the environment and also learn different methods for their detection
  13. Understand various biogeochemical cycles – Carbon and Nitrogen, and microbes involved.
  14. Understand the basic principles of organism and environment interaction and application of the same in solving environmental problems – waste water treatment and bioremediation
  15. Learn the basic concepts, principles and processes in Environmental Geo-Sciences.
  16. Have the ability of explanation of concepts, principles and usage of the acquired knowledge in environmental chemistry, energy and environment, aquatic biology, computer applications, environmental biotechnology, microbiology, ecological and agricultural applications.
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## Punyashlok Ahilyadevi Holkar Solapur University, Solapur

### B. Sc. First Year (Liberal Science) Semester-I

#### Generic Elective: ENVIRONMENTAL SCIENCE (Paper-I)

#### Paper No-I: ECOLOGICAL FACTORS AND ECOLOGICAL RELATIONSHIP

##### Teaching Scheme:

Lectures – 3 Hours/week, 2 Credits

Practical – 4 Hours/week, 4 Credits

##### Examination Scheme:

UA – 40 Marks

CIE – 10 Marks

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#### Unit 1: Ecological Factors

(15 Lectures)

**Objective:** To get the knowledge about the basic concepts ecological factors and their inter-relationships, significance.

**Outcome:** The student can understand the basics of ecological factors.

#### Unit 2: Ecological Relationship

(15 Lectures)

**Objective:** To get the knowledge about the ecological relationships.

**Outcome:** The student can understand importance of ecological relationship in environment

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# Punyashlok Ahilyadevi Holkar Solapur University, Solapur

## B. Sc. First Year (Liberal Science) Semester-I

### Generic Elective: ENVIRONMENTAL SCIENCE (Paper-II)

#### Paper –II Climatology and Meteorology

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**Teaching Scheme:**

Lectures – 3 Hours/week, 2 Credits

Practical – 4 Hours/week, 4 Credits

**Examination Scheme:**

UA – 40 Marks

CIE – 10 Marks

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#### Paper -II Climatology and Meteorology

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**Unit 1: Climatology****(15 Lectures)**

**Objective:** To get the knowledge climate concepts, theories and major national and global issues.

**Outcome:** The student can understand and learnt about the climate phenomena and applications.

**Unit 2: Meteorology****(15 Lectures)**

**Objective:** To get the knowledge about meteorological parameters and its significance.

**Outcome:** The student can understand about the applications of meteorological parameters in environment and other sectors.

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## **Punyashlok Ahilyadevi Holkar Solapur University, Solapur**

### **B. Sc. First Year (Liberal Science) Semester-I**

#### **Generic Elective: ENVIRONMENTAL SCIENCE (Paper-I)**

#### **Paper No-I: ECOLOGICAL FACTORS AND ECOLOGICAL RELATIONSHIP**

##### **Teaching Scheme:**

**Lectures – 3 Hours/week, 2 Credits**

**Practical – 4 Hours/week, 4 Credits**

##### **Examination Scheme:**

**UA – 40 Marks**

**CIE – 10 Marks**

##### **Unit 1: Ecological Factors**

**(15 Lectures)**

Modern Branches of Ecology, Applications and Significance to Human Beings. Environmental Factors - Light, temperature, precipitation (rainfall), humidity. Atmosphere: gases and wind, atmospheric gases, wind factor and fire factor, topographic and edaphic factors. Different environmental laws and limiting factors (Liebig's law of minimum, Shelford's law of Tolerance, Combined concept of limiting Factors). Biotic community, Interdependence in a community and community metabolism, Community ecology: structure, composition and development of community, species diversity in communities, Ecotones, Concept of edge effect, Ecological niche, Gause's Principle.

##### **Unit 2: Ecological Relationship**

**(15 Lectures)**

Inter specific and intraspecific relationships- species interactions - symbiotic relationships Neutralisms, Mutualism, Commensalisms, Ammensilism Antagonisms, Antagonistic Relationships, Symbiosis, and Protocorporation, Exploitation, Parasitism, Competition, Predation mimicry, herbivory and symbiotic relationships. Ecological adaptations: Adaptations in plants- Hydrophytes, Mesophytes, Xerophytes. Adaptations in Animals- Aquatic and desert.

##### **References**

1. Begon, M., Townsend, C.R. and Herper, J.L. (2005). Ecology: From Individuals to Ecosystems, 4th Edition, John Wiley & Sons.
2. Botkin, D. and Edward, K. (1997). Environmental Sciences, John Wiley & Sons, New York.
3. Chapman, J. L. and Reiss, M. J. (1998). Ecology: Principles and Applications. Cambridge University Press, UK.
4. Cunningham, W. P. and Cunningham, M. A. (2004). Principles of Environment Science. Enquiry and Applications. 2nd Edition. Tata McGraw Hill, New Delhi.
5. Dash, M.C. and Dash, S.P. (2009). Fundamentals of Ecology. McGraw Hill Education.



6. Odum, E.P. (2005). Fundamentals of Ecology, 5th Edition, Cengage Learning Publication.
  7. Raven, P. H., Berg, L.R. and Hassenzahl, D.M. (2008). Environment. 6th Edition. John Wiley & Sons., USA.
  8. Sharma, P.D. (2000). Ecology & Environment, 7th Edition, Rastogi Publications, Meerut.
  8. Singh, J.S., Singh, S.P. and Gupta, S.R. Ecology, Environment and Resource Conservation. Anamaya Publishers, New Delhi, India. 2006.
  9. Smith, T.M. and Smith, R.L. (2015). Elements of Ecology. 9th Edition, Pearson Benjamin Cummings, USA.
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# Punyashlok Ahilyadevi Holkar Solapur University, Solapur

## B. Sc. First Year (Liberal Science) Semester-I

### Generic Elective: ENVIRONMENTAL SCIENCE (Paper-II)

#### Subject Name- Climatology and Meteorology

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**Teaching Scheme:**

Lectures – 3 Hours/week, 2 Credits

Practical – 4 Hours/week, 4 Credits

**Examination Scheme:**

UA – 40 Marks

CIE – 10 Marks

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**Unit 1: Climatology****(15 Lectures)**

Difference Between Weather and Climate, Three States of Water, Sources of Atmospheric Moisture, Hydrological Cycle (Water Cycle), Evaporation, Factors Affecting Rate of Evaporation, Condensation, Forms of Condensation- Frost, Fog, Mist, Smog and Clouds, Fog- Classification According to Visibility and on the basis of appearance, Smog- Theory of Formation, Adverse Effects on Human Being, Difference between Smog and Fog. Case Studies. Concept of Clouds: Definition, Mechanism of Cloud Formation, Classification of Clouds, Role of Clouds in Weather Forecasting, Importance, Basic Types and Methods of Weather Forecasting, cloud seedling or artificial rainfall method.

**Unit 2: Meteorology****(15 Lectures)**

Meteorology: Definition, Aims and Objectives of meteorology, Primary Meteorological Parameters -Temperature, Winds and their Origin, Wind direction and Wind Speed Wind Patterns, Secondary Meteorological Parameters- Humidity, Relative Humidity and Absolute Humidity, Precipitation, Pressure, Solar radiation. Meteorological measurements: Psychrometer and its Working, Anemometer, Types of Anemometers and their Functions. Minimum and maximum temperature thermometer, bob calorimeter, solar radiation measurement. Atmospheric stability and mixing heights; temperature inversion; plume behavior; Gaussian plume model, artificial rain fall process.

**References:**

1. Hardy, J.T. 2003. Climate Change: Causes, Effects and Solutions. John Wiley & Sons.
2. Harvey, D. 2000. Climate and Global Climate Change. Prentice Hall.
3. Barry, R. G. 2003. Atmosphere, Weather and Climate. Routledge Press, UK. 15
4. Gillespie, A. 2006. Climate Change, Ozone Depletion and Air Pollution: Legal Commentaries with Policy and Science Considerations. Martinus Nijhoff Publishers.
5. Manahan, S.E. 2010. Environmental Chemistry. CRC Press, Taylor and Francis Group.

6. Maslin, M. 2014. *Climate Change: A Very Short Introduction*. Oxford Publications. Mathez, E.A. 2009. *Climate Change: The Science of Global Warming and our Energy Future*. Columbia University Press.
  7. Mitra, A.P., Sharma, S., Bhattacharya, S., Garg, A., Devotta, S. & Sen, K. 2004. *Climate Change and India*. Universities Press, India.
  8. Philander, S.G. 2012. *Encyclopedia of Global Warming and Climate Change* (2nd edition). Sage Publications.
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**Punyashlok Ahilyadevi Holkar Solapur University, Solapur**

**B. Sc. First Year (Liberal Science) Semester-II**

**Generic Elective: ENVIRONMENTAL SCIENCE (Paper-III)**

**Subject Name- Atmospheric Chemistry and Management**

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**Teaching Scheme:**

**Lectures – 3 Hours/week, 2 Credits**

**Practical – 4 Hours/week, 4 Credits**

**Examination Scheme:**

**UA – 40 Marks**

**CIE – 10 Marks**

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**Unit 1: Introduction of Atmospheric Chemistry**

**(15 Lectures)**

**Objective:** To learn about atmosphere, chemical species, impacts, monitoring and control methods. This part will cover ambient as well as industrial environment.

**Outcome:** Students will get an idea about monitoring, assessment and control of air pollutants. This study will help to decision makers for development of that area.

**Unit 2: Management of Atmospheric pollutants**

**(15 Lectures)**

**Objective:** To get an idea about monitoring methods and management of air pollutants or chemical species at the source.

**Outcome:** Students will get knowledge about monitoring and management of chemical species.

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# Punyashlok Ahilyadevi Holkar Solapur University, Solapur

## B. Sc. First Year (Liberal Science) Semester-II

### Generic Elective: ENVIRONMENTAL SCIENCE (Paper-III)

#### Subject Name- Atmospheric Chemistry and Management

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**Teaching Scheme:**

Lectures – 3 Hours/week, 2 Credits

Practical – 4 Hours/week, 4 Credit

**Examination Scheme:**

UA – 40 Marks

CIE – 10 Marks

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**Unit 1: Introduction of Atmospheric Chemistry****(15 Lectures)**

Atmospheric composition, evolution of the atmosphere, Big Bang Theory, distribution of elements, reactions in the atmosphere, Earth's Radiations Balance, chemical species and particulate in the atmosphere. Chemical reaction in the atmosphere, photochemical reactions in atmosphere; smog formation, types of smog (sulphur smog and photochemical smog), aerosols; chemistry of acid rain, case studies; reactions of NO<sub>2</sub> and SO<sub>2</sub>; free radicals and ozone layer depletion, role of CFCs in ozone depletion.

**Unit 2: Management of Atmospheric pollutants****(15 Lectures)**

Ambient air quality: monitoring and standards (National Ambient Air Quality Standards of India); air quality index; sources and types of pollutants (primary and secondary); smog (case study); effects of different pollutants on human health (NO<sub>x</sub>, SO<sub>x</sub>, PM, CO, CO<sub>2</sub>, hydrocarbons and VOCs) and control measures; indoor air pollution: sources and effects on human health. National air monitoring programme. Control of inorganic emissions, clean coal technology, coal conversion, industrial clean-up technology. Air pollution control equipment's: settlers, cyclone collectors, air filters, scrubbers and electrostatic precipitators.

**References:**

1. Beard, J.M. 2013. Environmental Chemistry in Society (2nd edition). CRC Press.
2. Boeker, E. & Grondelle, R. 2011. Environmental Physics: Sustainable Energy and Climate Change. Wiley.
3. Connell, D.W. 2005. Basic Concepts of Environmental Chemistry (2nd edition). CRC Press.
4. Forinash, K. 2010. Foundation of Environmental Physics. Island Press.
5. Girard, J. 2013. Principles of Environmental Chemistry (3rd edition). Jones & Bartlett.
6. Harnung, S.E. & Johnson, M.S. 2012. Chemistry and the Environment. Cambridge University Press.
7. Hites, R.A. 2012. Elements of Environmental Chemistry (2nd edition). Wiley & Sons.

8. Manhan, S. E. 2000. Fundamentals of Environmental Chemistry. CRC Press.
  9. Pani, B. 2007. Textbook of Environmental Chemistry. IK international Publishing House.
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## Punyashlok Ahilyadevi Holkar Solapur University, Solapur

### B. Sc. First Year (Liberal Science) Semester-II

#### Generic Elective: ENVIRONMENTAL SCIENCE (Paper-IV)

#### Subject Name- Introduction to Water and Soil Chemistry

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**Teaching Scheme:**

Lectures – 3 Hours/week, 2 Credits

Practical – 4 Hours/week, 4 Credits

**Examination Scheme:**

UA – 40 Marks

CIE – 10 Marks

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**Unit 1: Introduction to Hydrosphere****(15 Lectures)**

**Objective:** To get the knowledge about hydrosphere, types, characteristics, sampling and physico-chemical analysis methods of water bodies.

**Outcome:** Students can understand about status of water availability and they will understand availability of water resource and learn about monitoring and management of water bodies.

**Unit: 2 Introduction to Pedology****(15 Lectures)**

**Objective:** To get knowledge about soil formation, soil pollution, effects on plants or crops, soil analysis and control measures.

**Outcome:** Students will get knowledge and idea about soil quality assessment for understanding of soil fertility for crops.

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## Punyashlok Ahilyadevi Holkar Solapur University, Solapur

### B. Sc. First Year (Liberal Science) Semester-II

#### Generic Elective: ENVIRONMENTAL SCIENCE (Paper-IV)

#### Subject Name- Introduction to Water and Soil Chemistry

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**Teaching Scheme:**

Lectures – 3 Hours/week, 2 Credits

Practical – 4 Hours/week, 4 Credits

**Examination Scheme:**

UA – 40 Marks

CIE – 10 Marks

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**Unit 1: Introduction to Hydrosphere****(15 Lectures)**

Chemical Composition of Surface, Ground and Sea Waters and their Characteristics, Degradation Due to Natural and Man Made Activities-Sewage and Domestic Wastes, Industrial Effluents, Agricultural Discharges, Toxic Metals and Thermal Pollutants. Necessity of Water Analysis, Water Sampling, Types of Water samples, Selection of Sampling Site, Collection, Handling, Preservation of Samples, Information to be Submitted along with the Samples, Various Water Bodies for Sampling, Monitoring Water Quality of a Water Bodies, Physical Parameters, Chemical Parameters and Biological parameters, Significance and Standards, Presentation and Interpretation of Results. Water Quality Criteria for Drinking Purpose. Indian Standard Specification for Drinking Water, WHO Guidelines, The safe drinking water act.

**Unit: 2 Introduction to Pedology****(15 Lectures)**

Definition, Composition of Soil, Importance of Soil, Components of Soil, Soil Organisms and Role, Formation of Soil, Factors Affecting Soil Formation. Weathering and Soil type of India, Soil Profile Differentiation, Formation and Weathering of Rocks. Properties of Soil:

- i. Physical Properties: Soil Textures, Structure of Soil, Soil Density, Porosity of Soil, Permeability of Soil, Soil Colors, Soil Temperature, Soil Air & Soil Water.
- ii. Chemical Properties of Soils: Inorganic Matter of Soil, Organic Matter of Soil, Colloidal Properties of Soil, Soil Reactions and Buffering Action, Cation Exchange Capacity, Acidic Soils and Basic Soils.

Issues of Soil Sciences - Soil Erosion, Soil Conservation: Aims and Objectives. Soil Fertility, Causes and Maintenance, Soil Fertility Factors, Humus-Composition, Characteristics and Functions. Soil Degradation and its Causes, Impacts, Role of National Wasteland Development Board (NWDB).

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**References:**

1. Environmental Chemistry by A.K. Dey, Wiley Eastern Ltd, New Delhi, 1989.
  2. Elements of Environmental Science by P. Meenakshi, Prentice Hall India, New Delhi.
  3. Environmental Problems and Solution by D.K. Asthana, S.Chand Publication.
  4. Environmental Awareness by K.C. Chandana, Kalayni Pulisher (U.P.) 1998.
  5. Environmental Analysis by M.M. Saxena, Agro Botanical Publisher, Bikaner.
  6. Hand Book of Agricultural Science” S.S. Sing, Kalyani Publisher (U.P.), 1999.
  7. A text book of environmental chemistry and pollution control, Dara, S. S., S. Chand & Company Ltd, New Delhi.
  8. Environmental Pollution, Khitoliya, R. K., S. Chand and Company, New Delhi.
  9. Environmental Pollution and Control, 4<sup>th</sup> edition, J. Jeffrey Peirce, Ruth E Weiner, E Aarne Vesilind, Boston Oxford Johannesburg Melbourne New Delhi Singapore.
  10. Principles of Environmental Chemistry, 3<sup>rd</sup> edition, J. E. Girard, Jones & Bartlett Learning, Company, Burlington.
  11. The Science of Environmental Pollution, 3<sup>rd</sup> edition, Frank R. Spellman, CRC Press, Taylor & Francis Group.
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**(GENERIC ELECTIVE) PRACTICAL - ENVIRONMENTAL SCIENCE**  
**B. Sc. First Year (Liberal Science) Semester-I & II**

**Practical – I : ENVIRONMENTAL SCIENCE**

**Teaching Scheme:**

**Practical – 4 Hours/week, 4 Credits**

**Examination Scheme:**

**UA – 80 Marks**

**CIE – 20 Marks**

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List of Practical's: (Minimum 20 Maximum 25)

Students should perform minimum 20 practical during Semester I & II

**List of Practical (based on paper no I to IV):**

1. To Determine the Relative Humidity of Air Using Psychrometer Consisting of Wet and Dry Bulb Thermometers.
  2. Determination of Wind Speed and Wind Direction with Cup and Propeller Type of Anemometer.
  3. Wind rose diagram and use of portable weather tracker
  4. Measurement of Light Intensity by Lux Meter.
  5. Measurement of solar constant.
  6. Estimation of atmospheric pressure, rainfall and insolation
  7. Study of Plant Communities by Quadrata Method and to Study its Characteristic-Density, Frequency and Abundance.
  8. Measurement of Primary Productivity in a Water Body by Light & Dark Bottle Method.
  9. To Study the Food Chain in an Aquatic Ecosystem.
  10. Water sampling for ground and surface water and its storage techniques.
  11. Physico-Chemical Parameters (Colour, Temperature, Turbidity) for Characterizing and Evaluation of Water Quality.
  12. Determination of Hydrogen Ion Concentration (pH) of Water and Wastewater.
  13. Estimation of Total Solids, Total Dissolved Solids, Total Suspended Solids by gravimetric method of Water and Wastewater.
  14. Estimation of Conductivity of Water and Wastewater.
  15. Estimation of Chlorides of Water and Wastewater by Argentometric Method.
  16. Estimation of Alkalinity of Water and Wastewater.
  17. Estimation of Acidity of Water and Wastewater.
  18. Estimation of Total Hardness of Water and Wastewater.
  19. Soil sampling methodology by quartering method.
  20. Study of Soil Profile
  21. Determination of Bulk Density of Soil.
  22. Determination of Moisture Content of Soil.
  23. Determination of Water Holding Capacity of Soil.
  24. Determination of Soil Texture of Soil.
  25. Soil organic carbon and organic matter
  26. Field visit to Ecological site, Industrial area, meteorology department, polluted site visits etc.
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