

**Department of Botany (EVS)**

**Shyam Lal College**

**UNIVERSITY OF DELHI**

**Teaching Plan for 2024-25**

**Teacher Name: Dr. Sunaina Zutshi**

**Course: 1. B.Com program I<sup>st</sup> Year 2. B.Com (H) 1<sup>st</sup> Year 3. B.sc Physical Sciences 1<sup>st</sup> Year**

**Semester: I**

**Subject: AEC: Environmental Sciences: Theory into practice (1)**

**Learning Objectives**

The Ability Enhancement Course on Environmental Science: Theory into Practice (I) at Undergraduate level (AEC-I) aims to train students to cater to the need for ecological citizenship through development of a strong foundation on the critical linkages between ecology-society- economy.

**The Learning Objectives of this course are as follows:**

**Disciplinary Knowledge**

Enable students to develop a comprehensive understanding of various facets of life forms, ecological processes and the impacts on them by humans during the Anthropocene era.

**Critical Thinking**

Builds capabilities to identify relevant environmental issues, analyze the various underlying causes, evaluate the practices and policies, and develop framework to make informed decisions.

**Moral And ethical awareness/reasoning**

Develop empathy for all life forms, appreciation for the various ecological linkages within the web of life, awareness and responsibility towards environmental protection and nature preservation.

**Learning Outcome**

Analyses natural processes and resources that sustain life and govern economy.

Predict the consequences of human actions on the web of life, global economy, and quality of human life.

Think critically and develop appropriate strategies (Scientific, social, economic, administrative and legal) for environmental protection, conservation of biodiversity, environmental equity, and sustainable development.

Demonstrate values and show compassionate attitudes towards complex environmental economic-social challenges, and participate at national and international levels in solving current environmental problems and preventing the future ones.

Adopt sustainability as practices in life, society and industry.

| S.No | Topics  | Lectures required (approx.) |  |
|------|---|-----------------------------|--|
| 1    | <p><b>UNIT]: 1</b> Multidisciplinary nature of environmental studies; components of environment: atmosphere, hydrosphere, lithosphere and biosphere.</p> <p>Scope and importance; concept of sustainability and sustainable development; Brief History of environmentalism.</p>   | Week 1-2                    |  |
| 2    | <p><b>UNIT]: 2</b> Ecosystems: Definition and concept of Ecosystem. Structure of ecosystem (biotic and abiotic components); Functions of Ecosystem Physical (energy flow), Biological (food chains, food web, ecological succession) and Biogeochemical (nutrient cycling) processes. Concepts of productivity, ecological pyramids and homeostatis. Types of Ecosystems: Tundra, Forest, Grassland, Desert, Aquatic (ponds, streams, lakes, rivers, oceans, estuaries), importance and threats with relevant examples from India. Ecosystem services (Provisioning, Regulating, Cultural, and Supporting); Ecosystem preservation and conservation strategies; Basics of Ecosystem restoration</p> | Week 3-7                    |  |
| 3    | <p><b>UNIT-III</b> Natural Resources: Land resources: Minerals, soil, agricultural crops, natural forest products, medicinal plants, and forest-based industries and livelihoods; Land cover, land use change, land degradation, soil erosion, and desertification; Causes of deforestation; Impacts of mining and dam building on environment, forests, biodiversity, and tribal communities Water resources: Natural and man-made sources: Uses of water: Over exploitation of surface and ground water resources;</p>  | WEEK 8-11                   |  |

|   |  |   |  |
|---|--|---|--|
|   | Floods, droughts, and international & inter-state conflicts over water<br>Energy resources: Renewable and non-renewable energy sources; Use of alternate energy sources; Growing energy needs, Energy contents of coal. Petroleum, natural-gas and bio gas: Agro-residues As biomass energy source<br>Case studies: Contemporary Indian issues related to mining, dams, Forests, energy, etc. (e.g. National Solar Mission, Cauvery River water conflict, Sardar Sarovar dam. Chipko movement, Appiko movement.<br>Tarun Bharat Singh etc)   |   |  |
| 4.  | <b>UNIT- IV Environmental Pollution and Control</b><br>Environmental pollution (Air, water, soil, thermal, and noise): causes, effects, and controls; Primary and secondary air pollutants; Air and water quality standards. Nuclear hazards and human health risks<br>Solid waste management: Control measures for various types of urban, industrial waste, Hazardous waste, E-waste, etc.; Waste segregation and disposal, Pollution control measures: Introduction to legal, biological, and physico-chemical methods; Role in sustainability<br>Pollution case studies: Ganga Action Plan (GAP), Delhi air pollution and public health issues, Plastic waste management rules, Bhopal gas tragedy, etc. | WEEK 12-15  |  |
|   | <b>Assignment, Class Test and internal practical test Schedule for Semester</b>  | Assignment to be allocated in week 5-6 and week 9-11<br>Class test to be held as per schedule during week 12-13 |  |
| <p><b>Marks Breakup: 50 marks for continuous internal assessment (Project work, Assignment, Practical record, Class test/Discussion/PPt. etc.)</b></p> <p><b>30 marks for final Theory exam</b></p> |  |   |  |

### Practical component

Experiential activities/Outreach activities (15 Weeks)

#### Unit 1: Introduction to Environmental Studies

Analysis of achievement of Sustainable Development goal of any country

Gain insight of sustainability framework for an industrial activity using activity worksheets.

Use of environmental activity worksheets to understand interdependence and interactions between different environmental components

#### Unit 2: Ecosystems

Schematic collection of data for depicting ecological pyramids in the College campus

Differentiation of natural and managed ecosystems using Google Earth Google Map

Field visit to terrestrial and aquatic ecosystems (a) forests, (b) grasslands, (c) wetlands, (d) biodiversity parks, etc.

Develop a working model of any ecosystem. Use of work sheets to identify structure and function of different ecosystems.

### **Unit 3: Natural Resources**

Visit to a paper recycling unit/rainwater harvesting plant/solar plant biogas plant in the College campus

Develop and understand working model of renewable/non-renewable sources of energy Mapping of natural resources of a given study area using Google Earth

Time-series analysis of natural resource consumption of a given country using publicly available data

Comparison of energy demand and consumption of a particular state over the years using graphical tools

Assessing the consumption pattern of a natural resource in the dominant industry at local scale and status of natural resource in areas supplying it

### **Unit 4: Environmental Pollution**

Determine the water quality of a given location using Rapid pollution monitoring Kits Assess air quality index AQI of any location using real time air quality parameters Determine magnitude of solid waste generated in a home/college on monthly basis

Develop and maintain compost/Vermi compost using biodegradable waste in the college Identify suitability of given water samples for various purposes using given kits

Prepare water audit report of the college/house/ locality/colony. Map solid and liquid discharge of the college/colony and develop a management plan (Show it using schematic diagram, and photographs)

Repurpose waste for economic and environmental benefits in your college/near-by area/colony (submit a small video)

Analyze river-society-economy nexus based on primary or secondary data (use quantitative data, and show it using photographs on a poster)

## **Essential/recommended readings**

### **Unit 1: Introduction to Environmental Studies**

1. Raven, P.H, Hassenzahl, D.M., Hager, M.C, Gift, N.Y., and Berg, L.R. (2015). Environment, 8<sup>th</sup> Edition. Wiley Publishing. USA. Chapter 1 (Pages: 1-17); Chapter 2 (Pages: 22-23); Chapter3(Pages: 40, 41); Chapter 4 (Pages: 64, 66).
2. Singh, J.S., Singh, S.P., and Gupta, S.R. (2017) Ecology. Environmental Science and Conservations. S. Chand Publishing, New Delhi. Chapter 1 (Page: 3-28).

### **Unit 2: Ecosystems**

1. Odum, E.P. Odum, H.T., and Andrews, J. (1971). Fundamentals of Ecology. Saunders, Philadelphia, USA. Chapter 1 (Pages: 1-16); Chapter 2 (Pages: 18-76); Chapter 10 (Pages: 414- 458).
2. Raven, P.H, Hassenzahl, D.M., Hager, M.C, Gift, N.Y., and Berg, L.R. (2015). Environment, 9<sup>th</sup> Edition. Wiley Publishing, USA. Chapter 3 (Pages: 38-52); Chapter 4 (Pages: 53-62); Chapter5 (Pages: 100-103): Chapter 6 (Pages: 106-128).
3. Singh, J.S., Singh, S.P., and Gupta., S.R. (201). Ecology, Environmental Science and Conservation. S. Chand Publishing. New Delhi. Chapter 13 (Pages: 307-323); Chapter 18 (Pages: 420-442); Chapter 28 (Pages 74-69)

### **Unit 3: Natural Resources**

1. Gadgil, M. and Guha, R. (1993). This Fissured Land an Ecological History of India. University of California Press, Berkeley, USA. (pp. 1-245).
2. Mc Cully. P. (1996). Rivers no more: the environmental effects of dams. In: Silenced Rivers: The Ecology and Politics of Large Dams, Zed Books, New York, USA. Page. 29-64.
3. Raven. PH, Hassenzahl, D.M., Hager, M.C, Gift, N.Y. and Berg. LR (2015). Environment, 9<sup>th</sup> Edition Wiley Publishing, USA. Chapters 10, 11., 12, 13 (Pages: 180 263). Chapter 14 (Pages:272-275): Chapter 15 (Pages: 286-289)
4. Singh, J S., Singh, S.P. and Gupta, S.R. (2017). Ecology, Environmental Science and Conservation. S. Chand Publishing. New Delhi. Chapter 25 (Pages: 623-663).

### **Unit 4: Environmental Pollution**

1. Brusseau, ML, Pepper, LL. and Gerba, CP. (2019), Environmental and Pollution Science, 3rdEdition. Academic Press, USA. Chapter 16 (Pages: 243-255); Chapter 18 (Pages: 280-305); Chapter 21 (Pages: 352-358): Chapter 22 (Pages: 365-374); Chapter 23 (Pages: 378-388); Chapter 25 (Pages: 416-426)

2. Raven, P.H, Hassenzahl, D. M., Hager, MC, Gift, N.Y. and Berg. L.R. (2015). Environment,9th Edition. Wiley Publishing USA Chapter 19 (Pages: 359-381); Chapter 21 (Pages: 401-421), Chapter 23 (Pages 440-453)
3. Singh, J.S. Singh, SP. and Gupta, SR (2017) Ecology, Environmental Science and Conservation. S. Chand Publishing, New Delhi Chapters 19, 20, 12 (Pages: 445-535).

**Suggested readings**

1. Raven, PH. Hassenzahl, D.M., Hager, MC, Gift, N.Y. and Berg. L.R. (2015). Environment, 9<sup>th</sup> Edition. Wiley Publishing USA
2. Carson, R. (2002). Silent Spring Houghten Mifflin Harcourt, USA.
3. Brusseau, M.L., Pepper, IL and Gerba CP. (2019) Environmental and Pollution Science, 3rdEdition. Academic Press, USA.

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**Teaching Plan for 2024-25**

**Teacher Name: Dr. Sunaina Zutshi**

**Course: All Courses**

**Semester: I, III and V**

**Subject: SEC: Organic Farming**

**Learning objectives**

To create awareness among the students about organic farming and its importance insustainable agriculture. To provide a skill set of Organic farming to students to help them become self-reliant.

**Learning Outcomes**

After completion of this course the learners will be able to:

- Practice organic farming along with application of indigenous knowledge.
- Establish entrepreneurial ventures and generate employment (Organic Grower).
- Evaluate the organic produce as per FSSAI standards (Government rules).

| S.No | Topics  | Lectures required (approx.) |  |
|------|---|-----------------------------|--|
| 1    | Study of Organic Farming as an integrated approach. Soil analysis-physical testing and assessment of soil types, weighment, water movement,soil conditioners, etc. Manure preparation and introduction to compost, composting and its value additionquality test. | Week 1-2                    |  |
| 2    | Study of Indigenous Technology Knowledge (ITK) for nutrient, insect, pest disease andweed management, Study of various agriculturally useful Bio fertilizers and Biocontrol agents including Integrated Pest Management.  | Week 3-7                    |  |
| 3    | Study of traditional organic input preparation/formulation of Biofertilizer, biopesticides,plant health promoters like <i>Panchgavya</i> , <i>Beejamrut</i> etc., Study of the system   | Week 8-11                   |  |

|   |   |   |  |
|---|---|---|--|
|   | of organic certification and inspection, Branding of rural products, FSSAI, marketing, packaging and handling of organic produce. |   |  |
| 4 | Current Government schemes related to organic farming, Visit organic farms to study the various components and their utilization. | Week 12-15                                      |  |
|   | <b>Project work/Dissertation/Continuous evaluation will be based on (Hand-on Practical/ VivaVoce/Presentations)</b>               | Allocated in week 5-6 and week 9-11             |  |
|   | <b>Field visit and outreach programs /Assessment</b>  | Executed at intervals/<br>Continuous evaluation |  |
|   | <b>Project /Portfolio and Viva Voce</b>   | 30 marks  |  |
|   | <b>Report of Field Visit</b>  | 05 marks  |  |
|   | <b>Practical Records</b>  | 10 marks  |  |
|   | <b>Attendance</b>   | 05 marks  |  |
|   | <b>Total</b>  | 80 Marks  |  |

### Essential Readings:

1. Dhama, A.K. (2014). Organic Farming for Sustainable Agriculture (2<sup>nd</sup> edition), Agrobios(India), Jodhpur.
2. Sharma, Arun K. (2013). A Handbook of Organic Farming, Agrobios (India), Jodhpur
3. Palaniappan, S.P. and Anandurai, K. (1999). Organic Farming – Theory and Practice.Scientific Pub. Jodhpur
4. Thapa, U and Tripathy, P. (2006). Organic Farming in India, Problems and prospects,Agritech, Publising Academy, Udaipur.
5. Jaivik Kheti Sahayak Pustika- National Centre for Organic and Natural Farming,Department of Agriculture & Farmers Welfare, GoI.



**Suggestive Readings:**

1. National Program for Organic Production-APEDA, Ministry of Commerce & Industry, GoI.