**Integral University, Lucknow**

| **Effective from Session:** 2022-2023 | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Course Code** | **B150101T/ES125** | **Title of the Course** | **Basics of Environmental Science** | **L** | **T** | **P** | **C** |
| **Year** | **I** | **Semester** | I | **3** | **1** | **0** | **4** |
| **Pre-Requisite** | 10+2 | **Co-requisite** | | | | | |
| **Course Objectives** | This course provides students with a working knowledge of concept of environment and the relation between human and its relation with the environment. | | | | | | |

| **Course Outcomes** | |
|---|---|
| **CO1** | Gain knowledge about origin of life and related theories. |
| **CO2** | Learn fundamental concept of environmental science. |
| **CO3** | Develop the understanding about environmental education and able to understand the relationship between human and environment. |
| **CO4** | Understand the concept of sustainable development and SDG and also able to understand the current scenario of environmental degradation. |
| **CO5** | Learn the significance and importance of environmental management and have the practical knowledge about the affected areas of environment. |

| **Unit No.** | **Title of the Unit** | **Content of Unit** | **Contact Hrs.** | **Mapped CO** |
|---|---|---|---|---|
| 1 | Evolution | Origin of life and speciation, Darwinism and modern synthetic theory of evolution, Natural Selection; Biochemical basis of origin of life; Hardy Weinberg Equilibrium; Genetic drift. | 8 | CO1 |
| 2 | Concept of Environment | Definition, Principles and Scope of Environmental Science; Environment, its components and segments; Moral and Aesthetic Nature of Environmental Science; Objectives and Historic roots of the subject; for Public Awareness. | 8 | CO2 |
| 3 | Environmental | Goals of environmental education; Environmental Literacy, Environmental Careers, Environmental Justice, Individual Organisms, Environmentalism, Environmental Education at Primary, Secondary level. | 6 | CO3 |
| 4 | Man and Environment: | Man-Environment relationships; Impacts of human activity on environment (Agriculture, transportation, mining, urbanization, industrialization); Environmental Degradation and Conservation Issues, Modern concept of environmental conservation | 8 | CO3 |
| 5 | Sustainable development | Concept and Significance of sustainable development, Core elements of sustainable development, Over-view of SDG (Sustainable Development Goals). | 6 | CO4 |
| 6 | Current Environmental Issues | Ill effects of fireworks and environmental degradation, Climate change and its effects on human health, Deforestation and its impacts on human communities and flora and fauna of the Environment. | 8 | CO4 |
| 7 | Environmental Management | Significance of Environment Management, Resettlement and rehabilitation of project affected areas, Environmental ethics: Role of Indian's religions and cultures in environmental conservation, Communication and public awareness programs for environment management. | 8 | CO5 |
| 8 | Field Survey | Assessment of impacts of anthropogenic activities in the surrounding environment; Evaluation of the consequences rising from agricultural and commercial logging practices to preserve environment, case study, Reclamation and monitoring of the affected area by developmental activities: case study. | 8 | CO5 |

**Reference Books:**


1. Environmental Science by William P. Cunningham and Mary Ann Cunningham; McGraw-Hill Publications.
2. Environmental Science: Earth as a Living Planet by Botkin and Keller; JOHN WILEY & SONS, INC
3. A text Book of Environment Studies, Asthana, D. K. and Asthana, M. 2006, S. Chand & Co.
4. Environmental Encyclopedia, Jaico Publ. House, Mumabai, 1196p
5. Atmosphere, Weather and Climate, Barry, R. G. 2003, Routledge Press, UK.
6. Environmental Science: S. C. Santra, New Central Book Agency.


**e-Learning Source:**

1. Environmental Science, Dr. Y. K. Singh, https://www.hzu.edu.in/bed/E%20V%20S.pdf
2. Textbook for Environmental Studies, Erach Bharucha, https://www.ugc.ac.in/oldpdf/modelcurriculum/env.pdf
3. Fundamentals of Environmental Studies, https://www.jkcprl.ac.in/download/11567250727.pdf

**Course Articulation Matrix: (Mapping of COs with POs and PSOs)**

| PO-PSO / CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 | PSO6 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CO1** | 3 | 2 | - | - | - | - | - | - | - | - | - | - | 2 | 2 | - | - | - | - |
| **CO2** | 3 | 3 | - | - | - | - | - | - | - | - | - | - | 3 | 2 | - | - | - | - |
| **CO3** | 2 | 2 | - | - | - | - | - | - | - | - | - | - | 2 | 3 | - | - | - | - |
| **CO4** | 3 | 3 | - | - | - | - | - | - | - | - | - | - | 2 | 2 | - | - | - | - |
| **CO5** | 2 | 1 | - | - | - | - | - | - | - | - | - | - | 3 | 2 | - | - | - | - |

**1- Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation**

| **Name & Sign of Program Coordinator** | **Sign & Seal of HoD** |
|---|---|

**Integral University, Lucknow**

| **Effective from Session:** 2022-23 | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Course Code** | **B150103T / ES126** | **Title of the Course** | **Earth & Earth Surface Processes** | **L** | **T** | **P** | **C** |
| **Year** | I | **Semester** | I | 3 | 1 | 0 | 4 |
| **Pre-Requisite** | 10+2 | **Co-requisite** | | | | | |
| **Course Objectives** | The purpose of this course is to impart basic and key knowledge of Earth Surface and its processes. This will help in enhancing knowledge of Solar System, Earth, Atmosphere, Hydrosphere, Geological timescale and evolution of Earth, Weathering and Erosion, different types of Rocks and Plate Tectonics. After successfully completion of course, the student will able explore subject into their respective dimensions. | | | | | | |

| **Course Outcomes** | |
|---|---|
| **CO1** | Students will be able to analyze formation of Solar System, details about Earth, Atmosphere & Hydrosphere through study of Solar System and history of Earth. |
| **CO2** | Students will be able to Analyze role of Plate Tectonics in Various Earth Surface Processes. |
| **CO3** | Create in student's ability to understand about changes in Earth's history with time and movements of continents |
| **CO4** | Students will be able to evaluate the significance of Rocks and role of atmosphere as life support system. |
| **CO5** | Students will Evaluate the importance of mountains in Earth Surface processes. |

| **Unit No.** | **Title of the Unit** | **Content of Unit** | **Contact Hrs.** | **Mapped CO** |
|---|---|---|---|---|
| 1 | Solar System & Its Formation | Solar System formation: Sun, Planets, Moon, asteroids, Meteoroids, Formation of Earth, Differentiation of the Earth, Evidence of Differentiation of Earth. | 6 | CO1 |
| 2 | Planet Earth , its Composition & Internal Structure | Size and Distance , Orbit and Rotation, Earth's Chemical Composition, Internal Structure of Earth, gravitational and magnetic fields of the earth, origin of the main geomagnetic field | 8 | CO1 |
| 3 | Lithospheric Plates & Plate Tectonics | Movement of Lithosphere Plates, Mantle Convection, Plate Tectonics, Major Plates, Plate Tectonic Boundaries :Destructive, Constructive & Conservative Plate boundaries | 8 | CO2 |
| 4 | Geological Time Scale & Major Changes on the Earth Surface | Geological Time Scale, Geochronology, Divisions of Geologic Time Scale: Eon, Era, Period & Epoch, Cryptozoic Eon, Phanerozoic Eon, Holocene & emergence of Humans, Mass extinctions | 6 | CO3 |
| 5 | Theory & Concepts related to movements of Continents and Disasters having origin inside Earth | Hydrosphere as life support System, Sea Floor Spreading , Continental Drift Theory & evidences in support, Hot Spots, Volcanoes & Earthquake | 8 | CO3 |
| 6 | Mineral & Rocks | Minerals and important rock forming minerals, rock Cycle, lithification , metamorphism Igneous Rocks, Sedimentary Rocks & Metamorphic Rocks, Physical Weathering Processes, Chemical Weathering Processes, Biological Weathering Process, Erosion & agents of Erosion, Physical Processes of Erosion, Factors affecting Erosion | 8 | CO4 |
| 7 | Atmosphere as Life Support System | Role of Atmosphere on Earth: evolution of earth's atmosphere, composition and structure of atmosphere, physical and optical properties, circulation; interfaces: atmosphere–ocean interface, atmosphere–land interface, ocean–land interface; land surface processes. | 8 | CO4 |
| 8 | Importance of being a mountain | Formation of Peninsular Indian mountain systems - Western and Eastern Ghats, Vindhyas, Aravallis, etc. Formation of the Himalaya; development of glaciers, perennial river systems and evolution of monsoon in Indian subcontinent; formation of Indo-Gangetic Plains | 8 | CO5 |

**Reference Books:**


1. Bridge, J., & Demicco, R. 2008. Earth Surface Processes, Landforms and Sediment deposits. Cambridge University Press

2. Duff, P. M. D., & Duff, D. (Eds.). 1993. Holmes' Principles of Physical Geology. Taylor & Francis.

3. Gupta, A.K., Anderson, D.M., & Overpeck, J. T. 2003. Abrupt changes in the Asian southwest monsoon during the Holocene and their links to the North Atlantic Ocean. Nature 421: 354-357.


**e-Learning Source:**

1.https://swayam.gov.in/

2. https://ocw.mit.edu/courses/earth-atmospheric-and-planetary-sciences/12-163-surface-processes-and-landscape-evolution-fall-2004/lecture-notes/

3.https://nptel.ac.in/courses/105104190/

**Course Articulation Matrix: (Mapping of COs with POs and PSOs)**

| **PO-PSO CO** | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 | PSO6 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CO1** | 2 | 3 | - | - | - | - | - | - | - | - | - | - | 2 | 3 | - | - | - | - |
| **CO2** | 3 | 1 | - | - | - | - | - | - | - | - | - | - | 2 | 3 | - | - | - | - |
| **CO3** | 2 | 2 | - | - | - | - | - | - | - | - | - | - | 2 | 3 | - | - | - | - |
| **CO4** | 1 | 3 | - | - | - | - | - | - | - | - | - | - | 2 | 3 | - | - | - | - |
| **CO5** | 3 | 1 | - | - | - | - | - | - | - | - | - | - | 2 | 3 | - | - | - | - |

**2- Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation**

| | |
|---|---|
| **Name & Sign of Program Coordinator** | **Sign & Seal of HoD** |

**Integral University, Lucknow**

| **Effective from Session:** 2022-2023 | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Course Code** | **B150102P/ES127** | **Title of the Course** | **Practical on Environment** | **L** | **T** | **P** | **C** |
| **Year** | **I** | **Semester** | I | **0** | **0** | **4** | **2** |
| **Pre-Requisite** | 10+2 | **Co-requisite** | | | | | |
| **Course Objectives** | This course provides students with a working knowledge of Lab practices, environment and its relation with the human being, Meteorological parameters. | | | | | | |

| **Course Outcomes** | |
|---|---|
| **CO1** | Students will be able to understand the good Laboratory Practices including Dos & DON'Ts in the laboratory. |
| **CO2** | Students will be able to learn interaction of human with environment. |
| **CO3** | Students develop understanding about local environmental problems and able to find remedy. |
| **CO4** | Gain knowledge about different meteorological parameters. |
| | |

| **Unit No.** | **Title of the Unit** | **Content of Unit** | **Contact Hrs.** | **Mapped CO** |
|---|---|---|---|---|
| 1 | Good Lab Practices (GLP). | i. Instructions ,ii. DOs and DON'Ts in the Laboratory,iii. General Information,iv. Introduction | 8 | CO1 |
| 2 | Environmental Issues and Impacts | Study the effects of environmental problem and its impact on human population. | 8 | CO2 |
| 3 | Plants/ Trees and Its Importance | Choose five common species of Trees / plants from your near areas and list their common names.Describe each plant in terms of its height and leaves | 8 | CO3 |
| 4 | Weather Parameters measuring Devices | To record the following parameters of weather monitoring station:<br>A. Atmospheric Pressure, B.Rainfall, C.Outdoor, indoor temperature D.Wind speed and Direction E.Humidity & draw point | 8 | CO4 |

**Reference Books:**


Environmental Science: Earth as a Living Planet by Botkin and Keller; JOHN WILEY & SONS, INC.

A text Book of Environment Studies, Asthana, D. K. and Asthana, M. 2006, S. Chand & Co.

Atmosphere, Weather and Climate, Barry, R. G. 2003, Routledge Press, UK.

Environmental Science: S. C. Santra, New Central Book Agency.


**e-Learning Source:**

1. Good Lab Practices, https://youtu.be/YXl6MLvcGic; https://youtu.be/TADfGsai3Ro.

2.Indian Meteorological Department, Weather, https://mausam.imd.gov.in/imd_latest/weather_video/video.php.

3, Atmospheric Pressure, https://youtu.be/r7ZfzJ-yP3U; https://youtu.be/JQp63iUYSgU.

4. Anemometer, https://youtu.be/cWzGDEDVEgY; https://youtu.be/J5Eh6EU18Us;https://youtu.be/n5deIWQigrk.

5. Rain gauge, https://youtu.be/y6tyAy_MRv0; https://youtu.be/IU9CsbAkRbc.

| | **Course Articulation Matrix: (Mapping of COs with POs and PSOs)** | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **PO-PSO CO** | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 | PSO6 |
| **CO1** | 1 | 2 | - | - | - | - | - | - | - | - | - | - | 2 | 3 | - | - | - | - |
| **CO2** | 2 | 2 | - | - | - | - | - | - | - | - | - | - | 3 | 2 | - | - | - | - |
| **CO3** | 3 | 2 | - | - | - | - | - | - | - | - | - | - | 2 | 2 | - | - | - | - |
| **CO4** | 2 | 2 | - | - | - | - | - | - | - | - | - | - | 2 | 2 | - | - | - | - |

**3- Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation**

| | |
|---|---|
| **Name & Sign of Program Coordinator** | **Sign & Seal of HoD** |

**Department of Environmental Science**

| **Effective from Session:** | 2022-2023 | | | | | | |
|---|---|---|---|---|---|---|---|
| **Course Code** | **B150104P/ES128** | **Title of the Course** | **Earth Surface Processes Lab.** | **L** | **T** | **P** | **C** |
| **Year** | **I** | **Semester** | I | **0** | **0** | **4** | **2** |
| **Pre-Requisite** | 10+2 | **Co-requisite** | | | | | |
| **Course Objectives** | This course provides students with a working knowledge of optical physics, including diffraction, polarization and laser physics. | | | | | | |

| **Course Outcomes** | |
|---|---|
| **CO1** | Students will be able to Analyze formation of Solar System. |
| **CO2** | Students will be able to Analyze role of geological time scale and internal structure of Earth. |
| **CO3** | Create in student's ability to understand about identification of Mineral and physical properties of Earth. |
| **CO4** | Create in student's ability to understand about identification of Rocks. |

| **Unit No.** | **Title of the Unit** | **Content of Unit** | **Contact Hrs.** | **Mapped CO** |
|---|---|---|---|---|
| 1 | To Study about Solar System through a Model | Students will be able to Analyze formation of Solar System | 8 | CO1 |
| 2 | To Study about geological Time Scale through a Model To Study about internal Structure of Earth through a Model. | Students will be able to Analyze role of geological time scale and internal structure of Earth. | 8 | CO2 |
| 3 | Identification of Mineral using Physical Properties: Feldspar, Quartz, Muscovite, Galena, Haematite | Create in student's ability to understand about identification of Mineral and physical properties of Earth | 8 | CO3 |
| 4 | Identification of Rock: | Create in student's ability to understand about identification of Rocks.<br>Identification of Rock:<br>a. Igneous Rocks: Granite, Compact Basalt, Rhyolite.<br>b. Sedimentary Rocks: Sandstone, Limestone, Shale, Laterite, Conglomerate.<br>c. Metamorphic Rocks: Slate, Marble | 8 | CO4 |

**Reference Books:**


1. Bridge, J., & Demicco, R. 2008. Earth Surface Processes, Landforms and Sediment deposits. Cambridge University Press
2. Duff, P. M. D., & Duff, D. (Eds.). 1993. Holmes' Principles of Physical Geology. Taylor & Francis.
3. Gupta, A.K., Anderson, D.M., & Overpeck, J. T. 2003. Abrupt changes in the Asian southwest monsoon during the Holocene and their links to the North Atlantic Ocean. Nature 421: 354-357.


**e-Learning Source:**

https://soe.unipune.ac.in/studymaterial/swapnaGaikwadOnline/3bgeologictimescaleandextinction-150126074104-conversion-gate02.pdf

2. http://ppup.ac.in/download/econtent/pdf/Geological%20Timescale%20-%20BA%20Part%201,%20Paper%20-1,%20unit%20-2.pdf
3. https://www3.nd.edu/~cneal/planetearth/Chapt-13-Marshak.pdf
4. https://sci.waikato.ac.nz/evolution/Geoltimescale.pdf
5. https://www.dnr.sc.gov/geology/pdfs/education/Geologic%20Time.pdf
6. https://ncert.nic.in/textbook/pdf/fess201.pdf
7. https://web.njit.edu/~cao/Phys320_L8.pdf
8. https://nitsri.ac.in/Department/Civil%20Engineering/CIV-404(P)_Geology_Lab_EGM_Lab_Manual_2.pdf
9. https://egyankosh.ac.in/bitstream/123456789/58880/1/EXPERIMENT%204.pdf
10. https://www.atri.edu.in/images/pdf/publications/Manual_Geology.pdf
11. https://www.youtube.com/watch?v=libKVRa01L8
12. https://www.youtube.com/watch?v=EytrFc9qIOo

**Course Articulation Matrix: (Mapping of COs with POs and PSOs)**

| **PO-PSO CO** | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 | PSO6 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CO1** | 3 | 2 | | | | | | | | | | | 3 | 3 | | | | |
| **CO2** | 3 | 2 | | | | | | | | | | | 3 | 3 | | | | |
| **CO3** | 3 | 2 | | | | | | | | | | | 3 | 3 | | | | |
| **CO4** | 3 | 2 | | | | | | | | | | | 3 | 3 | | | | |

**1- Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation**

| **Name & Sign of Program Coordinator** | **Sign & Seal of HOD** |
|---|---|

**Integral University, Lucknow**

| **Effective from Session:** 2022-2023 | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Course Code** | B150105T/ES129 | **Title of the Course** | Society and Environment | **L** | **T** | **P** | **C** |
| **Year** | **I** | **Semester** | I | **3** | **1** | **0** | **4** |
| **Pre-Requisite** | 10+2 | **Co-requisite** | | | | | |
| **Course Objectives** | **This course provides students the knowledge and understanding of environmental issues and social inequalities** | | | | | | |

| **Course Outcomes** | |
|---|---|
| **CO1** | To develop the social and cultural attitude towards the environment. |
| **CO2** | To develop attitude among students on the issues arising from anthropogenic activities. |
| **CO3** | To develop clear thinking about inequalities of class, gender, race and the rehabilitation of the project affected people. |
| **CO4** | To develop attitude towards the issues arising from the development of urbanization and technological development and its impact on environment. |
| **CO5** | To enable students to participate as a volunteer on various environmental issues |

| **Unit No.** | **Title of the Unit** | **Content of Unit** | **Contact Hrs.** | **Mapped CO** |
|---|---|---|---|---|
| 1 | Introduction | Social and cultural construction of 'environment'; environmental thought from historical and contemporary perspective in light of the concepts of Gross Net Happiness and Aldo Leopold's Land Ethic | 6 | CO1 |
| 2 | Environmental Issues | Significant global environmental issues such as acid rain, climate change, and resource depletion; historical developments in cultural, social and economic issues related to land, forest, and water management in a global context | 8 | CO2 |
| 3 | Environment and Social Inequalities | Inequalities of race, class, gender, region, and nation-state in access to healthy and safe environments; development-induced displacement, resettlement, and rehabilitation: problems, concerns, and compensative mechanisms; discussion on Project Affected People (PAPs). | 8 | CO3 |
| 4 | Urbanization and Environment | Production and consumption-oriented approaches to environmental issues in Indian as well as global context; impact of industry and technology on environment; urban sprawl, traffic congestion and social-economic problems; conflict between economicand environmental interests. | 8 | CO4 |
| 5 | Community participation | State, corporate, civil society, community, and individual-level initiatives to ensure sustainable development; case studies of environmental movements (Appiko Movement, Chipko Movement, Narmada Bachao Andolan) | 8 | CO4 |
| 6 | Environmental Ethics | Principle of Environmental ethics, issues and possible solutions; Ethical Dimension of Global Environmental Issues; Living and Coping with World Risk Society; The Risk Society Thesis | 8 | CO5 |
| 7 | Environmental groups and Organization | Corporate responsibility movement; appropriate technology movement; environmental groups and movements, citizen groups; role played by NGOs; Environmental education and awareness; New Social Movements and the Environmental Concerns; Political Ecology | 8 | CO5 |
| 8 | Human-environmental Impact | Soil degradation, Landform change, Hydrology, Plant distribution, Climatology, interface between environment and society | 6 | CO1 |

**Reference Books:**


1. Chokkan, K.B., Pandya, H. & Raghunathan, H. (eds). 2004.
2. Understanding Environment. Sagar Publication India Pvt. Ltd., New Delhi.
3. Elliot, D. 2003. Energy, Society and Environment, Technology for a Sustainable Future. Routledge Press.
4. National Research Council (NRC). 1996. Linking Science and Technology to Society's Environmental Goals National Academy Press


**e-Learning Source:**

1. https://www.britannica.com/topic/environmentalism/History-of-the-environmental-movement
2. chrome-extension://efaidnbmnnnibpcajpcglclefindmkaj/https://ncert.nic.in/textbook/pdf/lebo116.pdf

| | **Course Articulation Matrix: (Mapping of COs with POs and PSOs)** | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **PO-PSO CO** | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 | PSO6 |
| **CO1** | 2 | 1 | - | - | - | - | - | - | - | - | - | - | 1 | 1 | - | - | - | - |
| **CO2** | 3 | 2 | - | - | - | - | - | - | - | - | - | - | 2 | 1 | - | - | - | - |
| **CO3** | 3 | 1 | - | - | - | - | - | - | - | - | - | - | 2 | 2 | - | - | - | - |
| **CO4** | 3 | 1 | - | - | - | - | - | - | - | - | - | - | 1 | 2 | - | - | - | - |
| **CO5** | 2 | 1 | - | - | - | - | - | - | - | - | - | - | 1 | 2 | - | - | - | - |

**Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation**

| | |
|---|---|
| **Name & Sign of Program Coordinator** | **Sign & Seal of HoD** |

**Integral University, Lucknow**

| **Effective from Session:** 2022-2023 | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Course Code** | **B 1 5 0 1 0 6 P / E S 130** | **Title of the Course** | **Environment and Society Lab** | **L** | **T** | **P** | **C** |
| **Year** | **I** | **Semester** | I | **0** | **0** | **4** | **2** |
| **Pre-Requisite** | 10+2 | **Co-requisite** | | | | | |
| **Course Objectives** | This course provides students the knowledge of plantation of nearby areas; management of solid waste and environmental problems of nearby areas with its solution | | | | | | |

| **Course Outcomes** | |
|---|---|
| **CO1** | To know about management of solid waste. |
| **CO2** | To gain the knowledge of environmental problems of nearby areas with its solution. |
| **CO3** | To gain the knowledge of Relationship of Human and Environment. |
| **CO4** | To know about the plantation of nearby areas including medicinal plants. |
| **CO5** | |

| **Unit No.** | **Title of the Unit** | **Content of Unit** | **Contact Hrs.** | **Mapped CO** |
|---|---|---|---|---|
| 1 | Understanding of Solid Waste Management Techniques | Visit to Solid Waste Treatment Plan | 8 | CO1 |
| 2 | Recognization of environmental problems | Describe the environmental problem of your locality and suggest a remedy | 8 | CO2 |
| 3 | Relationship of Human and Environment. | Study of effects of human interaction with natural environment. | 8 | CO3 |
| 4 | Identification of Flora | Identification of flora and plantation of five medicinal trees in your area | 8 | CO4 |

**Reference Books:**


1. Environmental Science: Earth as a Living Planet by Botkin and Keller; JOHN WILEY & SONS
2. A text Book of Environment Studies
3. Atmosphere
4. Environmental Science: S. C. Santra


**e-Learning Source:**

1. http://learningintheleaves.co.uk/flora-and-fauna-identification
2. Systematic review of epidemiological studies on health effects associated with management of solid waste

| | **Course Articulation Matrix: (Mapping of COs with POs and PSOs)** | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **PO-PSO CO** | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO4 | PSO5 | PSO6 | PSO7 |
| **CO1** | 2 | 1 | | | | | | | | | | | 1 | 1 | | | | |
| **CO2** | 1 | 2 | | | | | | | | | | | 2 | 2 | | | | |
| **CO3** | 2 | 1 | | | | | | | | | | | 1 | 2 | | | | |
| **CO4** | 2 | 2 | | | | | | | | | | | 2 | 2 | | | | |
| **CO5** | | | | | | | | | | | | | | | | | | |

**4- Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation**

| | |
|---|---|
| **Name & Sign of Program Coordinator** | **Sign & Seal of HoD** |

**Integral University, Lucknow**

| Effective from Session: 2022-2023 | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Course Code** | **I050107T/P /ES131** | **Title of the Course** | **Rain water Harvesting System** | L | T | P | C |
| **Year** | **I** | **Semester** | **I** | 2 | 0 | 2 | 3 |
| **Pre-Requisite** | 10+2 | **Co-requisite** | | | | | |
| Course Objectives | This course provides students to acquire efficient process of assessment, mapping, and design of site plans for integrated water harvesting systems, it will also enable them to meet the increasing demand of water, reduce groundwater pollution, avoid the flooding of roads and reduce soil erosion. | | | | | | |

| **Course Outcomes** | |
|---|---|
| CO1 | To gain an understanding of the history, benefits, and components of a rainwater harvesting system. |
| CO2 | Understand the main purpose of a rainwater system. |
| CO3 | Understand the Rainfall Pattern |
| CO4 | To gain a detailed knowledge regarding time-tested and reliable methods of collecting, storing, transferring and treating rain water to be used as a substitute for potable water supplies. |
| CO5 | Understand the benefits of conservation of our natural resources. |

| Unit No. | Title of the Unit | Content of Unit | Contact Hrs. | Mapped CO |
|---|---|---|---|---|
| 1 | Introduction | Definition and Introduction to rain water and rain water harvesting, Hydrological Cycle, Ground water: Importance and formation, Need for rain water harvesting, Overview of rainwater harvesting concepts. | 5 | CO1 |
| 2 | Rain Water Harvesting | Inflow structures, Rain water harvesting systems, Storage for direct use, Artificial recharge of ground water aquifers, Artificial recharge techniques, Recharge pit/trench, Recharge shafts Bore well/dug well, Recharge pit/trough with soak ways, Recharge tube well (injection well). | 5 | CO2 |
| 3 | Rain Water Harvesting- Basics and Concepts | Rain water Harvesting, parameters to be considered in Rain Water Harvesting, Mean annual rainfall, Rainfall distribution and pattern, Rainwater usage and shelf life, Catchment, Coarse mesh, Gutters, Drain pipe, First flush, Filtration unit, Storage tank/ Sump, Estimation of Indoor water demand, Estimation of Outdoor water demand, Conservation and use of rainwater for Indoor and Outdoor purposes. | 5 | CO3 |
| 4 | Water Quality and Treatment | Considerations for the Rainwater Harvesting System Owner, Water Quality Standards,Factors Affecting Water Quality, Water Treatment | 5 | CO4 |
| 5 | Rainwater harvesting for Ground water recharge | Ground water recharge through open wells, Ground water recharge through bore-wells, Ground water recharge through recharge pits and pavements, Ground water recharge through gardens, parks and veranda's. | 5 | CO5 |
| 6. | Laws and Financial Policies for rainwater harvesting in India | Laws and Policies implemented by various cities in India, 'Environment (Protection) Act, 1986, The Rainwater (Harvesting & Storage) Bill-2016, The Rainwater (Compulsory Harvesting) Bill-2015. The Rainwater Capture Act- 2012, Legislations on rain water harvesting, Incentives from banks, Government subsidies for rain water harvesting. | 5 | CO5 |

**Reference Books:**


Traditional Water Harvesting Systems: An Ecological Economics Survey- Bhuban C Barah

Rain Water Harvesting : A New Concept to Utilize Rainwater and Secure the Future- J.M.Jaina & Brothers

Rainwater Harvesting for Drylands and Beyond, Volume 1, 3rd Edition: Guiding Principles to Welcome Rain into Your Life and Landscape- Brad Lancaster

Rainwater Harvesting for Drylands and Beyond, Volume 2, 2nd Edition: Water-Harvesting Earthworks- Brad Lancaster


**e-Learning Source:**

http://www.rainwaterharvesting.org/Policy/Legislation.htm

1161#:~:text=Rainwater%20harvesting%20has%20been%20made,500%20sq%20meters%20or%20more.&text=As%20per%20the%20regulation%2C%20all,or%20more%20than%20300%20sq.

https://byjus.com/biology/rainwater-harvesting/

https://rainharvesting.co.uk/types-of-rainwater-harvesting-systems/

https://www.treehugger.com/beginners-guide-to-rainwater-harvesting-5089884

**Course Articulation Matrix: (Mapping of COs with POs and PSOs)**

| PO-PSO / CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO4 | PSO5 | PSO6 | PSO7 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 2 | 2 | - | - | - | - | - | - | - | - | - | - | 3 | 2 | - | - | - | - |
| CO2 | 2 | 2 | - | - | - | - | - | - | - | - | - | - | 2 | 2 | - | - | - | - |
| CO3 | 2 | 3 | - | - | - | - | - | - | - | - | - | - | 2 | 3 | - | - | - | - |
| CO4 | 2 | 3 | - | - | - | - | - | - | - | - | - | - | 3 | 2 | - | - | - | - |
| CO5 | 1 | 2 | - | - | - | - | - | - | - | - | - | - | 2 | 3 | - | - | - | - |

**Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation**

| **Name & Sign of Program Coordinator** | **Sign & Seal of HoD** |
|---|---|

**Integral University, Lucknow**

| **Effective from Session:** 2022-23 | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Course Code** | Z010101T/BE105 | **Title of the Course** | Food, Nutrition and Hygiene | **L** | **T** | **P** | **C** |
| **Year** | First | **Semester** | First | 2 | 0 | 0 | 2 |
| **Pre-Requisite** | - | **Co-requisite** | - | | | | |
| **Course Objectives** | To learn the basic concept of food, nutrition, hygiene, common diseases prevalent in society alongwith 1000 days nutrition concept. | | | | | | |

| **Course Outcomes** | |
|---|---|
| **CO1** | To learn the basic concept of the Food and Nutrition, and meal planning. |
| **CO2** | To learn about macro and micro nutrients and its RDA, sources, functions, deficiency and excess. |
| **CO3** | To learn 1000 days Nutrition Concept and study the nutritive requirement during special conditions like pregnancyand lactation. |
| **CO4** | To study common health issues in the society and to learn the special requirement of food during common illness. |

| **Unit No.** | **Title of the Unit** | **Content of Unit** | **Contact Hrs.** | **Mapped CO** |
|---|---|---|---|---|
| 1 | Concept of Food and Nutrition | (a) Definition of Food, Nutrients, Nutrition, Health, balanced Diet<br>(b) Types of Nutrition- Optimum Nutrition, under Nutrition, Over Nutrition<br>(c) Meal planning- Concept and factors affecting Meal Planning<br>(d) Food groups and functions of food | 8 | 1 |
| 2 | Nutrients: Macro and Micro RDA, Sources, Functions, Deficiency and excess of | (a) Carbohydrate<br>(b) Fats<br>(c) Protein<br>(d) Minerals<br>Major: Calcium, Phosphorus, Sodium, PotassiumTrace: Iron, Iodine, Fluorine, Zinc<br>(e) Vitamins<br>Water soluble vitamins: Vitamin B, C Fat soluble vitamins: Vitamin A, D, E, K<br>(f) Water<br>(g) Dietary Fiber | 7 | 2 |
| 3 | 1000 daysNutrition | (a) Concept, Requirement, Factors affecting growth of child<br>(b) Prenatal Nutrition (0 - 280 days): Additional Nutrients' Requirementand risk factors during pregnancy<br>(c) Breast / Formula Feeding (Birth – 6 months of age)<br>Complementary and Early Diet (6 months – 2 years of age) | 8 | 3 |
| 4 | Community Health Concept | (a) Causes of common diseases prevalent in the society and Nutritionrequirement in the following:<br>Diabetes<br>Hypertension (High Blood Pressure)Obesity<br>ConstipationDiarrhea Typhoid<br>(b) National and International Program and Policies for improving Dietary Nutrition<br>(c) Immunity Boosting Food | 7 | 4 |

**Reference Books:**


Singh, Anita, "Food and Nutrition", Star Publication, Agra, India, 2018.

Sheel Sharma,Nutrition and Diet Therapy,Peepee Publishers Delhi,2014,First Edition.

1000Days-Nutrition_Brief_Brain-Think_Babies_FINAL.pdf

https://pediatrics.aappublications.org/content/141/2/e20173716

https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5750909/


**e-Learning Source:**

https://www.udemy.com/course/internationally-accredited-diploma-certificate-in-nutrition
Diploma in Human Nutrition-Revised Offered by Alison

| | **Course Articulation Matrix: (Mapping of COs with POs and PSOs)** | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **PO-PSO CO** | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 |
| **CO1** | - | - | - | 2 | 2 | 3 | 2 | 3 | 3 | 2 | 2 | - |
| **CO2** | - | - | - | 3 | 2 | 3 | 2 | 3 | 3 | 2 | 2 | - |
| **CO3** | - | - | - | 3 | 3 | 2 | 3 | 3 | - | - | 2 | - |
| **CO4** | - | - | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 2 | 3 | - |

**1- Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation**

| **Name & Sign of Program Coordinator** | **Sign & Seal of HoD** |
|---|---|

**Integral University, Lucknow**

| **Effective from Session:** 2022-2023 | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Course Code** | **B150201T/ES132** | **Title of the Course** | **Environmental Biology** | **L** | **T** | **P** | **C** |
| **Year** | **First** | **Semester** | Second | **3** | **1** | **0** | **4** |
| **Pre-Requisite** | 10+2 with Physics, Chemistry & (Maths/ Biology) | **Co-requisite** | | | | | |
| **Course Objectives** | This course introduces the basic principles of Environmental biology, ecology, and the relationship between humans and natural world. This major course is designed to provide students with a foundation in population, whole organism, evolutionary biology and environmental science as well as in chemistry and mathematic | | | | | | |

| **Course Outcomes** | |
|---|---|
| **CO1** | The student will be to understand the basic elements of ecology and environmental factors and ecosystem dynamics. |
| **CO2** | The course will lead the students understand the different functions played by ecosystem and its various positive and negative interactions with organisms. |
| **CO3** | Develop understanding about Evolutionary Theories, Ecological Succession and Taxonomy. |
| **CO4** | Ability to realize the usefulness of flora and fauna for pollution control mechanism. |
| **CO5** | Students will study about the growth of different types of microorganisms based on various environmental factors |

| **Unit No.** | **Title of the Unit** | **Content of Unit** | **Contact Hrs.** | **Mapped CO** |
|---|---|---|---|---|
| 1 | **Ecology** | Introduction of Ecology (Definition, History, Branches and Scope). Basic principles of Environment and Ecology; Environmental factors (Abiotic and biotic) their importance and role. | 8 | CO1 |
| 2 | **Ecosystem** | Components, Structure, and function of Ecosystem; Major ecosystems (terrestrial, aquatic, and marine); Trophic Levels, food chain and food webs; Energy flow in Ecological systems; Ecological Pyramids, Productivity. | 8 | CO2 |
| 3 | **Autecology** | Population Characteristics- Dispersion, Density, Natality, Mortality, Age Structure, Population Growth; Human population & growth; Ecological niche and habitat; Positive and Negative Interactions of Populations. | 6 | CO2 |
| 4 | **Synecology** | Community Structure, Growth Forms; Methods of Plant Community Analysis; Concept of Keystone Species, Ecotone, Ecotypes, Ecophene, ecological indicators; Ecological Succession. | 8 | CO3 |
| 5 | **Biogeochemical Cycles** | Hydrological, Gaseous and Sedimentary Cycle- Carbon, Oxygen, Nitrogen, Phosphorus and Sulphur Cycles; Major biome of the world. | 6 | CO4 |
| 6 | **Limiting factors of Environment** | Concept of limiting factors, laws of limiting factors – laws of minimum and tolerance, combined concept of limiting factors, Earth's carrying capacity | 8 | CO5 |
| 7 | **Taxonomy** | Definition of taxonomy, Systematics, and classification; morphological and taxonomical studies of flora and fauna. | 8 | CO3 |
| 8 | **Microbiology** | Basic concept on structures and functions of bacteria and viruses | 8 | CO5 |


1. Ecology and Environment: P.D. Sharma., Rastogi Publication.
2. Fundamental of Ecology: E. P. Odum,W. B. Sauders Company, USA
3. Ecology, 2nd Edition by Paul Colinvaux, Wiley.
4. Ecology: From Individuals to Ecosystems by Michael Begon & Colin R. Townsend & John L. Harper;Blackwell publishing.
5. Ecology: Theories and Applications (4th Edition) by Peter Stiling; Prentice Hall.
6. Textbook of Environmental Studies, Erach Bharucha, Orient longman Pvt. Ltd., Ernakulam.


**e-Learning Source:**

**1.** https://www.docsity.com/en/environmental-science-environmental-biology-lecture-notes/233205/

**2.** https://www.bdu.ac.in/cde/SLM/SLM_SAMPLE/BSc-Zoology.pdf

**3.** https://www.youtube.com/watch?v=I3WLJFXSbhw

**Course Articulation Matrix: (Mapping of COs with POs and PSOs)**

| **PO-PSO CO** | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 | PSO6 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CO1** | 3 | 2 | | | | | | | | | | | 3 | 2 | | | | |
| **CO2** | 3 | 3 | | | | | | | | | | | 3 | 2 | | | | |
| **CO3** | 2 | 2 | | | | | | | | | | | 2 | 2 | | | | |
| **CO4** | 3 | 3 | | | | | | | | | | | 3 | 2 | | | | |
| **CO5** | 2 | 2 | | | | | | | | | | | 2 | 2 | | | | |

**5- Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation**

| **Name & Sign of Program Coordinator** | **Sign & Seal of HoD** |
|---|---|

**Integral University, Lucknow**

| **Effective from Session:** 2022-2023 | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Course Code** | B150203T/ES133 | **Title of the Course** | Basics of Ecosystem Dynamics | **L** | **T** | **P** | **C** |
| **Year** | **I** | **Semester** | II | **3** | **1** | **0** | **4** |
| **Pre-Requisite** | 10+2 | **Co-requisite** | | | | | |
| **Course Objectives** | This course provides students the knowledge and understanding of Ecosystem Dynamics | | | | | | |

| **Course Outcomes** | |
|---|---|
| **CO1** | Student will recognize evolutionary processes and adaptations of plant and animal species. |
| **CO2** | To enable students to differentiate between exponential and logistic models of population growth. |
| **CO3** | Be able to explain the major Biomes of the world. |
| **CO4** | Students will be able to Illustrate the ecosystem Energetic. |
| **CO5** | Students will be able to understand and describe effects of disturbances, adaptation and development in ecosystem. |

| **Unit No.** | **Title of the Unit** | **Content of Unit** | **Contact Hrs.** | **Mapped CO** |
|---|---|---|---|---|
| 1 | Ecological Principles | Definition, Scope and basic principles of ecology and environment. Biological levels of organization, population, community, ecosystem and biosphere. Climatic factors-Solar radiations, temperature, water and precipitation. | 8 | CO1 |
| 2 | Habitat and Niche | Concept of habitat and niche; niche width and overlap; fundamental and realized niche; resource partitioning; character displacement. Soil formation, soil types, soil profiles. Physical and chemical characters of soil, Soil biological characters. Topographic factors | 8 | CO1 |
| 3 | Population Ecology | Basic concepts, population characteristics – density, natality, mortality, age-structure, population growth. Positive and negative interactions of populations – competition, predation, parasitism, mutualism. | 8 | CO2 |
| 4 | Community Ecology | Community: Basic concepts, community structure, growth forms, life form. Analytical and synthetic characters of plant community. Methods of plant community analysis. Concept of keystone species and ecotone. | 8 | CO2 |
| 5 | Biomes | Major biomes of the world, Characteristics of terrestrial Biomes like forests, grasslands, desert, mountain, Aquatic ecosystems like fresh water, estuary,marine ecosystems | 8 | CO3 |
| 6 | Ecosystem Energetic | Primary and gross productivity, decomposition, Environmental factors affecting plant productivity, Law of thermodynamics, Flow of Energy, Energy flow Models, Energy efficiencies | 6 | CO4 |
| 7 | Biogeography | Biogeography, Field of Biogeography, Principles of Biogeography, theory of island biogeography; Major biogeographical zones of India, Biogeography in evolution | 8 | CO5 |
| 8 | Disturbance, adaptation and development | Ecological disturbances like fire, insect outbreak etc., Introduction to ecological succession, Concepts of succession, Classification and Trends in Succession, Co-evolution and group selection. | 6 | CO5 |

**Reference Books:**


1. Muller-Dombols, D. and Ellenberg, H. (1974). Aims and Methods of Vegetation Ecology
2. Wiley, New York. Odum, E.P. (1983), Basic Ecology
3. Sanders, Philadelphia. Robert Ricklefs (2001). The Ecology of Nature. Fifth Edition.
4. W.H. Freeman and Company. Singh K.P. and J.S. Singh (1992). Tropical Ecosystems: Ecology and Management.


**e-Learning Source:**

3. https://www.britannica.com/search?query=Ecosystem%20dynamics
4. https://www.pdfdrive.com/from-energetics-to-ecosystems-the-dynamics-and-structure-of-ecological-systems-the-peter-yodzis-fundamental-ecology-series-e185582076.html

| | **Course Articulation Matrix: (Mapping of COs with POs and PSOs)** | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **PO-PSO CO** | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO4 | PSO5 | PSO6 | PSO7 |
| **CO1** | 3 | 2 | | | | | | | | | | | 1 | 1 | | | | |
| **CO2** | 2 | 2 | | | | | | | | | | | 2 | 1 | | | | |
| **CO3** | 2 | 2 | | | | | | | | | | | 2 | 2 | | | | |
| **CO4** | 2 | 2 | | | | | | | | | | | 1 | 2 | | | | |
| **CO5** | 2 | 2 | | | | | | | | | | | 1 | 2 | | | | |

**6- Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation**

| | |
|---|---|
| **Name & Sign of Program Coordinator** | **Sign & Seal of HoD** |

**Integral University, Lucknow**

| **Effective from Session:** 2022-2023 | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Course Code** | **B150202P/134** | **Title of the Course** | **Practical on Environmental Biology** | **L** | **T** | **P** | **C** |
| **Year** | **1st Year** | **Semester** | 2 | **0** | **0** | **4** | **2** |
| **Pre-Requisite** | 10+2 with Science | **Co-requisite** | | | | | |
| **Course Objectives** | This course provides an introduction to the basic laboratory principles. Furthermore, students will have hands on experience and perform laboratory work in identifying and analyzing different environmental problems related with air, water pollution, and environmental degradation. | | | | | | |

| **Course Outcomes** | |
|---|---|
| **CO1** | The student will be to understand about Good Laboratory Practice (GLP). |
| **CO2** | Student will develop practical knowledge on Measurement of different soil parameters. |
| **CO3** | Be able to Illustrate abiotic/biotic interactions and symbiotic relationships |
| **CO4** | Develop knowledge on Preparation of Herbarium and its Documentation |

| **Unit No.** | **Title of the Unit** | **Content of Unit** | **Contact Hrs.** | **Mapped CO** |
|---|---|---|---|---|
| 1 | Good Laboratory Practices | All Laboratory Rules and Regulations, Safety Precautions, Introduction to Laboratory Instruments, etc | 8 | CO1 |
| 2 | Soil Analysis | To Study the NPK of soil samples using soil analysis Kit. | 8 | CO2 |
| 3 | Ecosystem | Study of a simple ecosystem (Suggested habitats: pond, river, estuarine, grassland, forest and desert) and description of the biotic and abiotic components of the ecosystem | 8 | CO3 |
| 4 | Survey of Flora and Fauna | 1. Survey of vegetation in an area.<br>2. Survey of birds, insects and other animals in an area.<br>3. Preparation of Herbarium | 8 | CO4 |

**Reference Books:**


1. Muller-Dombols, D. and Ellenberg, H. (1974). Aims and Methods of Vegetation Ecology, Wiley, New York.
2. Odum, E.P. (1983), Basic Ecology, Sanders, Philadelphia.
3. Robert Ricklefs (2001). The Ecology of Nature. Fifth Edition. W.H. Freeman and Company.
4. Singh K.P. and J.S. Singh (1992). Tropical Ecosystems: Ecology and Management. Wiley Eastern Limited, Lucknow, India.
5. Singh, J.S. (ed.) 1993. Restoration of Degraded Land: Concepts and Strategies. Rastogi Publications, Meerut.
6. Smith, R.L. (1996). Ecology and Field Biology, Harper Collins, New York.
7. Botkin, D.B. and Keller, E.A. 2000. Environment Science: Earth as a living planet. ThirdEdition. John Wiley and Sons Inc.


**e-Learning Source:**

**1.** https://www.docsity.com/en/environmental-science-environmental-biology-lecture-notes/233205/

**2.** https://www.bdu.ac.in/cde/SLM/SLM_SAMPLE/BSc-Zoology.pdf

**3.** https://www.youtube.com/watch?v=I3WLJFXSbhw

| | **Course Articulation Matrix: (Mapping of COs with POs and PSOs)** | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **PO-PSO CO** | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 | PSO6 |
| **CO1** | **3** | **1** | **1** | **2** | **3** | **1** | **1** | _ | - | _ | _ | _ | **1** | **3** | **1** | **3** | **1** | _ |
| **CO2** | **3** | **1** | **1** | **1** | **1** | **1** | **1** | _ | - | _ | _ | _ | **1** | **3** | **1** | **3** | **1** | _ |
| **CO3** | **1** | **1** | **1** | **1** | **3** | **2** | **1** | _ | - | _ | _ | _ | **2** | **1** | **1** | **2** | **2** | _ |
| **CO4** | **2** | **1** | **1** | **1** | **2** | **3** | **1** | _ | - | _ | _ | _ | **1** | **2** | **3** | **1** | **1** | _ |
| **CO5** | **3** | **1** | **1** | **2** | **3** | **1** | **1** | _ | - | _ | _ | _ | **3** | **3** | **3** | **3** | **3** | _ |

**7- Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation**

| | |
|---|---|
| **Name & Sign of Program Coordinator** | **Sign & Seal of HoD** |

**Integral University, Lucknow**

| **Effective from Session:** 2022-2023 | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Course Code** | B150204P/ES135 | **Title of the Course** | Ecosystem Dynamics Lab | **L** | **T** | **P** | **C** |
| **Year** | First | **Semester** | Second | **0** | **0** | **4** | **2** |
| **Pre-Requisite** | 10+2 | **Co-requisite** | | | | | |
| **Course Objectives** | **This course provides students the knowledge and understanding of lab related to Ecosystem Dynamics.** | | | | | | |

| **Course Outcomes** | |
|---|---|
| **CO1** | Upon successful completion of this lab course students should be able to know about basic principles of ecology |
| **CO2** | To enable students to differentiate different types of Biotic interactions and Population Characteristics |
| **CO3** | Be able to explain the medicinal plants and its identification. |
| **CO4** | Students will be able to explain Important Value Index and different soil types of India. |
| **CO5** | |

| **Unit No.** | **Title of the Unit** | **Content of Unit** | **Contact Hrs.** | **Mapped CO** |
|---|---|---|---|---|
| 1 | Field Visit | Field visit to understand basic principles of ecology | 8 | CO1 |
| 2 | Biotic Interactions and Population Characteristics | Study of different types of Biotic interactions (Positive and Negative), Study of Population Characteristics. | 8 | CO2 |
| 3 | Studies of Ecosystems | Comparative Study on Natural and Artificial Ecosystem, Preparation of Herbarium of medicinal plants and identification of its components, Analysis of IVI (Important Value Index) through Quadrate method. | 8 | CO3 |
| 4 | Model Making | Study of different soil types of India and its characteristics, Different energy flow Models, Hydrach and Xerach Succession | 8 | CO4 |

**Reference Books:**


Richard J Hobbs, Katharine N Suding, James Aronson, Donald A Falk, New Models for Ecosystem Dynamics and Restoration (2009).

Mary Luzier Ecological Succession (ES2017).


**e-Learning Source:**

https://www.deshbandhucollege.ac.in/pdf/resources/1586278723_BT_(H)_IV-_ECOLOGY.pdf

https://www.magadhuniversity.ac.in/download/econtent/pdf/MU%20ecological%20succession%20-%20Rukhshana%20Parveen.pdf

https://ncert.nic.in/ncerts/l/kegy106.pdfhttps://ncert.nic.in/ncerts/l/kegy106.pdf

| | **Course Articulation Matrix: (Mapping of COs with POs and PSOs)** | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **PO-PSO CO** | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO4 | PSO5 | PSO6 | PSO7 |
| **CO1** | 3 | 2 | | | | | | | | | | | 3 | 1 | | | | |
| **CO2** | 3 | 2 | | | | | | | | | | | 2 | 1 | | | | |
| **CO3** | 3 | 2 | | | | | | | | | | | 2 | 1 | | | | |
| **CO4** | 2 | 2 | | | | | | | | | | | 2 | 1 | | | | |
| **CO5** | | | | | | | | | | | | | | | | | | |

**1- Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation**

| | |
|---|---|
| **Name & Sign of Program Coordinator** | **Sign & Seal of HoD** |

**Integral University, Lucknow**

| **Effective from Session:** 2022-23 | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Course Code** | **B150205T/ES136** | **Title of the Course** | **Introduction to Atmosphere & Global Climate Change** | **L** | **T** | **P** | **C** |
| **Year** | **I** | **Semester** | **II** | 3 | 1 | 0 | 4 |
| **Pre-Requisite** | 10+2 | **Co-requisite** | | | | | |
| **Course Objectives** | The purpose of this course is to impart basic and key knowledge of Atmosphere and Global Climate Change. This will help in enhancing knowledge of Influence of Meteorological Parameters and Atmospheric Circulation on Climate, contribution of Green Houses Gases in Global warming, remedial measures against Global warming and Climate Change and policies, Global and National Action Plan related to Climate Change mitigation. After successfully completion of course, the student will able explore subject into their respective dimensions. | | | | | | |

| **Course Outcomes** | |
|---|---|
| **CO1** | Students will be able to analyse Impact of Atmospheric Circulation on World Climate and Influence of Meteorological Parameters & Atmospheric Stability in shaping of Climate. |
| **CO2** | Students will be able to Evaluate the role of Remedial Measures in Combating Global Warming and Climate Change. |
| **CO3** | Students will be able to Evaluate Various Policies related to Climate Change mitigation Strategies and Create a knowledge base for Global and National Action Plans to combat Climate Change Issues. |
| **CO4** | Students will be able to Evaluate contribution of Green Houses Gases in Global warming and thereby bringing Change in Climate. |
| **CO5** | Students will Analyse the role of Ozone Depleting Substances in Ozone layer Depletion and efforts for mitigation of Ozone hole Problem. |

| **Unit No.** | **Title of the Unit** | **Content of Unit** | **Contact Hrs.** | **MappedCO** |
|---|---|---|---|---|
| 1 | AtmosphericCirculation | Movement of air masses; atmosphere and climate; air and sea interaction; southern oscillation; western disturbances; El Nino and La Nina; tropical cyclone; Indian monsoon and its development, changing monsoon in Holocene in the Indian subcontinent, its impact on agriculture and Indus valley civilization; effect of urbanization on micro climate; Asian brown clouds. | 8 | CO1 |
| 2 | Energy Balance | Earth's energy balance; energy transfers in atmosphere; Earth's radiation budget; green house gases (GHGs);greenhouse effect; global conveyor belt, Milankovitch cycles. | 8 | CO3 |
| 3 | Meteorological Parameters | Meteorological parameters (temperature, relative humidity, wind speed and direction, precipitation) | 6 | CO1 |
| 4 | Atmospheric Stability | Atmospheric stability and mixing heights; temperature inversion; plume behavior; Gaussian plume model | 6 | CO1 |
| 5 | Global Warmingand Climate Change | Earth's climate through ages; Global Warming; Climate Change; Relationship of Global warming with Climate Change, Trends of global warming and climate change; drivers of global warming and the potential of different green house gases (GHGs) causing the climate change; atmospheric windows. | 8 | CO2 |
| 6 | Climate Change and Impact | Impact of climate change on atmosphere, weather patterns, sea level rise, agricultural productivity and biological responses - range shift of species, $CO_2$ fertilization and agriculture; impact on economy and spread of human diseases. | 8 | CO4 |
| 7 | Ozone LayerDepletion | Ozone layer or ozone shield; importance of ozone layer; ozone layer depletion and causes; Chapman cycle; process ofspring time ozone depletion over Antarctica; ozone depleting substances (ODS); effects of ozone depletion; mitigation measures | 8 | CO5 |
| 8 | Climate Changeand Policy | Environmental policy debate; International agreements; Montreal protocol 1987; Kyoto protocol 1997; Convention on Climate Change; carbon credit and carbon trading; clean development mechanism. | 8 | CO3 |

**Reference Books:**


1. . Barry, R. G. 2003. Atmosphere, Weather and Climate. Routledge Press, UK.
2. Hardy, J.T. 2003. Climate Change: Causes, Effects and Solutions. John Wiley & Sons.
3. Harvey, D. 2000. Climate and Global Climate Change. Prentice Hall
4. Mitra, A.P., Sharma, S., Bhattacharya, S., Garg, A., Devotta, S. & Sen, K. 2004. Climate Change and India. Universities Press , India


**e-Learning Source:**

1. https://www.edx.org/learn/climate-change
2. https://www.coursera.org/learn/global-warming#syllabus

**1. Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation**

| | **Course Articulation Matrix: (Mapping of COs with POs and PSOs)** | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **PO-PSO CO** | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO4 | PSO5 | PSO6 | PSO7 |
| **CO1** | 2 | 3 | - | - | - | - | - | - | - | - | - | - | 2 | 3 | - | - | - | - |
| **CO2** | 2 | 3 | - | - | - | - | - | - | - | - | - | - | 2 | 3 | - | - | - | - |
| **CO3** | 2 | 3 | - | - | - | - | - | - | - | - | - | - | 2 | 1 | - | - | - | - |
| **CO4** | 2 | 3 | - | - | - | - | - | - | - | - | - | - | 2 | 3 | - | - | - | - |
| **CO5** | 2 | 3 | - | - | - | - | - | - | - | - | - | - | 2 | 3 | - | - | - | - |

| **Name & Sign of Program Coordinator** | **Sign & Seal of HoD** |
|---|---|

**Integral University, Lucknow**

| **Effective from Session:** 2022-2023 | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Course Code** | B150206P/ES137 | **Title of the Course** | Climate Study lab | **L** | **T** | **P** | **C** |
| **Year** | **I** | **Semester** | II | **0** | **0** | **4** | **2** |
| **Pre-Requisite** | 10+2 | **Co-requisite** | | | | | |
| **Course Objectives** | Upon successful of this Lab. course students should be able to know about weather conditions of a particular region, sequence of events that lead to Climate Change, Impact of Climate Change on Species and Climatic Classification of India. | | | | | | |

| **Course Outcomes** | |
|---|---|
| **CO1** | Students will be able to understand about Weather conditions of a particular region. |
| **CO2** | Students will be able to study about sequence of events that lead to climate change and trends of rise in green house gases concentration. |
| **CO3** | Students will be able to evaluate impacts of climate change on Species. |
| **CO4** | Students will be able to study about Climatic Classification of India based on Koppens System of Classification of Climate. |

| **Unit No.** | **Title of the Unit** | **Content of Unit** | **Contact Hrs.** | **Mapped CO** |
|---|---|---|---|---|
| 1 | Weather Conditions | To study about weather conditions of a particular region. | 8 | CO1 |
| 2 | Climate Change Events & Trends of Green House Concentration | To Study about sequence of events that lead to climate change.<br>To Study about trends of rise in green house gases concentration from Pre- Industrial | 8 | CO2 |
| 3 | Impact of Climate Change on Species | To study about Impact of Climate Change on Species | 8 | CO3 |
| 4 | Climatic Classification | To study about climatic classification of India based on Koppens System of classification of climate. | 8 | CO4 |

**Reference Books:**

https://soe.unipune.ac.in/studymaterial/swapnaGaikwadOnline/3bgeologictimescaleandextinction-150126074104-conversion-gate02.pdf

http://ppup.ac.in/download/econtent/pdf/Geological%20Timescale%20-%20BA%20Part%201,%20Paper%20-1,%20unit%20- 2.pdf

https://www3.nd.edu/~cneal/planetearth/Chapt-13-Marshak.pdf

https://sci.waikato.ac.nz/evolution/Geoltimescale.pdf

**e-Learning Source:**

https://www.youtube.com/watch?v=libKVRa01L8

https://www.youtube.com/watch?v=EytrFc9qIOo

https://www.youtube.com/watch?v=LhdO_Y-BauI

https://www.youtube.com/watch?v=tyjyUkfMdZM

| | **Course Articulation Matrix: (Mapping of COs with POs and PSOs)** | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **PO-PSO CO** | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO4 | PSO5 | PSO6 | PSO7 |
| **CO1** | 3 | 2 | - | - | - | - | - | - | - | - | - | - | 2 | 3 | - | - | - | - |
| **CO2** | 3 | 2 | - | - | - | - | - | - | - | - | - | - | 2 | 3 | - | - | - | - |
| **CO3** | 3 | 2 | - | - | - | - | - | - | - | - | - | - | 2 | 3 | - | - | - | - |
| **CO4** | 3 | 2 | - | - | - | - | - | - | - | - | - | - | 2 | 3 | - | - | - | - |

**8- Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation**

| | |
|---|---|
| **Name & Sign of Program Coordinator** | **Sign & Seal of HoD** |

**Integral University, Lucknow**

| **Effective from Session:** 2022-2023 | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Course Code** | **I150207T/P/ES138** | **Title of the Course** | **Effluent Treatment and Management** | **L** | **T** | **P** | **C** |
| **Year** | **1ST Year** | **Semester** | 2 | **2** | **0** | **2** | **3** |
| **Pre-Requisite** | 10+2 with Science | **Co-requisite** | | | | | |
| **Course Objectives** | This course provides students to enrich the knowledge on sources and characteristics of industrial wastewater, also emphasizes on design considerations of various unit operations and processes of effluent treatment facilities. | | | | | | |

**Course Outcomes**

| | |
|---|---|
| **CO1** | To gain knowledge about General characteristics of water and classification of the constituents and impurities in water. |
| **CO2** | Be able to learn objective and importance of Effluent treatment Plant. |
| **CO3** | Understand the benefits of conservation of our natural resources. |
| **CO4** | To focus on the waste water transport system and the theory and design technique for the Industrial waste water treatment process. |
| **CO5** | To gain a detailed knowledge regarding time-tested and reliable methods of collecting, storing, transferring and treating waste water to be used as a substitute for potable water supplies. |
| **CO6** | Students would have knowledge of Effluent treatment plants which are used by chemical and pharmaceutical industries to remove toxic material from waste water. |

| **Unit No.** | **Title of the Unit** | **Content of Unit** | **Contact Hrs.** | **Mapped CO** |
|---|---|---|---|---|
| 1 | Introduction to waste water,industrial effluents and its treatment concept | Definition and Introduction of waste water and Effluent treatment plant, Classification of waters, potable waters, Industrial effluents and domestic effluents, Water Cycle, Contaminated surface water, Need for waste water treatment plant, Overview of waste water treatment system concepts. | 8 | CO1 |
| 2 | Different types of waste water treatment plant | Process and mechanism of Waste water treatment system, Types of Effluent treatment plant , Sewage treatment plants. Structure of Storage . | 8 | CO2 |
| 3 | Mechanism of Primary, Tertiary treatment of waste water | Inflow structures, waste water treatment systems, Primary, Secondary and Tertiary treatment of waste water, Storage tank of waste water, coagulation, flocculation, | 8 | CO3 |
| 4 | Overview of Biological Treatment | Overview of biological Treatment, Water borne Pathogenic microbes, Bacterial growth, Aeration tank, Aerobic microbes, Biological oxygen demand, Anaerobic microbial fermentation and oxidation, Trickling filters , Combined aerobic processes, Activated sludge film packing. Methanogen microbes, Production of bi | 8 | CO4 |
| 5 | Advanced Treatment technologies | Technologies used in advanced treatment, Chlorination, Membrane Filtration Absorption, Ion Exchange , Advanced oxidation process. Testing of physical chemical and biological properties of water, Water Quality Standards, Physical chemical and Biological Factors Affecting Water Quality, Conservation and use of Waste water for Cleaning washing and Agriculture purposes | 8 | CO5 |
| 6 | Laws, Guidelines and policies | Laws and Policies implemented by various cities in India, 'Environment (Protection) Act, 1986, ,The Water (Prevention and Control of Pollution) Act, 1974, Legislations on waste water treatment , Status of sewage treatment in India' CPCB Guidelines for sewage Treatment Plants (STPs)2021, Government subsidies for Effluent Treatment and Management plant | 8 | CO 6 |

**Reference Books:**


1)Agarwal, K.C. 2001 Environmental; Biology, Nidi Pub. Ltd. Bikaner.

2) Bharucha Erach, The Biodiversity of India, Mapin Pub. Pvt. Ltd., Ahemdabad-380, India.

3) Brunner R.C. 1989. Hazardous waste incineration, Mc Graw Hill

4) Clark R.S. Marine Pollution, Clanderon Press Oxford (TB)


**e-Learning Source:**

1.https://cpcb.nic.in/status-of-stps/

2. https:// www.slideshare.net/sheshir/etp-effluent-treatment-plant

3. http://www.indiaenvironmentportal.org.in/content/456235/policy-for-reuse-of-treated-waste-water/

4. https:// www.slideshare.net/GhassanHadi/waste-water-treatment-120127260

5. https://www.onlinebiologynotes.com/sewage-treatment-process-of-wastewater-treatment/

6. https://www.onlinebiologynotes.com/sewage-treatment-process-of-wastewater-treatmen

7. http://www.sigmaenv.in/effluent-treatment-plant-ppt-2769696.html

**Course Articulation Matrix: (Mapping of COs with POs and PSOs)**

| **PO-PSO CO** | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 | PSO6 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CO1** | **3** | **1** | **2** | **3** | **1** | **2** | **1** | - | - | - | - | - | **1** | **2** | **3** | **1** | _ | _ |
| **CO2** | **3** | **2** | **1** | **3** | **2** | **2** | **3** | _ | - | - | - | - | **2** | **1** | **3** | **2** | _ | _ |
| **CO3** | **3** | **1** | **3** | **2** | **2** | **3** | **3** | _ | - | - | - | - | **1** | **3** | **2** | **2** | _ | _ |
| **CO4** | **2** | **1** | **2** | **3** | **2** | **2** | **3** | - | - | - | - | - | **1** | **2** | **3** | **2** | _ | _ |
| **CO5** | **3** | **2** | **2** | **3** | **2** | **3** | **3** | - | - | - | - | - | **2** | **2** | **3** | **2** | _ | _ |
| **CO6** | **3** | **2** | **2** | **3** | **2** | **3** | **3** | - | - | - | - | - | **2** | **2** | **3** | **2** | _ | _ |

**9- Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation**

| **Name & Sign of Program Coordinator** | **Sign & Seal of HoD** |
|---|---|

**Integral University, Lucknow**

| **Effective from Session:** 2022 | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Course Code** | B030202T/MT148 | **Title of the Course** | Basic Mathematics & Statistic | **L** | **T** | **P** | **C** |
| **Year** | I | **Semester** | II | **3** | **1** | **0** | **4** |
| **Pre-Requisite** | 10+2 | **Co-requisite** | | | | | |
| **Course Objectives** | The purpose of this undergraduate course is to impart basic and key knowledge of elementary mathematics. By using the principal of applied mathematics to obtain quantitative relations which are very important for higher studies. After successfully completion of course, the student will able to explore subject into their respective dimensions | | | | | | |

| **Course Outcomes** | |
|---|---|
| **CO1** | Students will be able to interpret limits and continuity of functions. Also they can find differential coefficient, differentiation of functions including function of a function, differentiation of parametric form, simple and successive differentiation. |
| **CO2** | Students will evaluate and interpret integration as an inverse of differentiation; They will be able to find indefinite integrals of standard form, integration by parts, by substitution and by partial fraction method. They can evaluate definite integrals. |
| **CO3** | Students can describe the basic concepts of simple random sampling and stratified random sampling. They can understand and find measures of central tendency (mean, median and mode), measures of variation (mean deviation and standard deviation), measure of coefficient if variation. Student will be able to understand and evaluate covariance and correlations, Karl Pearson's Coefficient of correlation and Spearman's coefficient of rank correlation. They can also be able to find regression by method of least squares. |
| **CO4** | Students can interpret the fundamental principle of counting. They will also be able to find permutations, permutations under certain conditions, combinations, combinatorial identities. They can also apply Binomial theorem (without proof) |
| **CO5** | Students will be able to understand the random experiment and associated sample space, events. They can also find probability and can use addition and multiplication theorems for finding probability (without proof). They will be able to understand probability distributions, and will be able to find Binomial, Poisson and Normal distributions. |

| **Unit No.** | **Title of the Unit** | **Content of Unit** | **Contact Hrs.** | **Mapped CO** |
|---|---|---|---|---|
| 1 | Limit and Continuity | Set and functions, left hand limit and right hand limit, limits of function, continuity of function | 7 | CO1 |
| 2 | Differentiability | Definition of differential coefficient, differentiation of function including function of a function, differentiation of parametric form, simple and successive differentiation, Leibnitz rule | 8 | CO1 |
| 3 | Integrations | Integration as inverse of differentiation, indefinite integrals of standard form, integration by parts, substitution method and partial fraction method. evaluation of definite integrals. | 8 | CO2 |
| 4 | Univariate Statistics | Basic concepts of simple random sampling and stratified random sampling, measures of central tendency (mean, median and mode), measures of variation (mean deviation, quartile deviation and standard deviation), coefficient of variation | 7 | CO3 |
| 5 | Bivariate Statistics | Covariance, correlations, scatter diagram, Karl Pearson's coefficient of correlation, Spearman's coefficient of rank correlation, regression and its coefficient, estimation of regression lines by the method of least square | 7 | CO3 |
| 6 | Permutations and Combinations | Fundamental principle of counting, permutations, permutations under certain conditions, combinations, combinatorial identities, Binomial theorem (without proof), some applications of Binomial theorem | 7 | CO4 |
| 7 | Probability theory | Random experiment and associated sample space, events, definition of probability, algebra of events, addition and multiplication theorems on probability (without proof), conditional probability, Baye's theorem | 8 | CO5 |
| 8 | Probability Distributions | Probability distribution, probability mass function, probability distribution function, expectations, Binomial, Poisson, normal distributions and their mean and variance, fitting the expected frequency of Binomial and Poisson distributions. | 8 | CO5 |

**Reference Books:**


1. Murray R. Spiegel, 1980, Probability and Statistics, Schaum's (Outline Series) McGraw-Hill Book Co.
2. Q. S. Ahmad, V. Ismail and S. A. Khan: Biostatistics, Laxmi Publications Pvt. Ltd.
3. E. Kreyszig, "Advanced Engineering Mathematics", 5th Edition, Wiley Eastern, 1985.
4. Higher Engineering Mathematics, B. V. Ramana. Tata McGraw Hill Publishers.


**e-Learning Source:**

1. NPTEL, MOOC

**Course Articulation Matrix: (Mapping of COs with POs and PSOs)**

| **PO-PSO / CO** | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PSO1 | PSO2 | PSO3 | PSO4 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **CO1** | 3 | | | | 1 | | 3 | 2 | | 2 | 2 |
| **CO2** | 3 | | | | 1 | | 3 | 2 | | 2 | 1 |
| **CO3** | 3 | | | | 3 | | 3 | 2 | | 1 | 2 |
| **CO4** | 3 | | | | 1 | | 3 | 2 | | 2 | 3 |
| **CO5** | 3 | | | | 3 | | 3 | 2 | | 2 | 3 |

**10- Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation**

| | |
|---|---|
| **Name & Sign of Program Coordinator** | **Sign & Seal of HoD** |

# Integral University, Lucknow

| **Effective from Session:** 2022 | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Course Code** | A040209- LN109 | **Title of the Course** | Basic of Communication | **L** | **T** | **P** | **C** |
| **Year** | First | **Semester** | Second | **3** | **1** | **0** | **4** |
| **Pre-Requisite** | | **Co-requisite** | | | | | |
| **Course Objectives** | To enhance basic communication skill among the students. Students will also learn about the fundamentals of linguistics and Grammars. | | | | | | |

| **Course Outcomes** | |
|---|---|
| **CO1** | Basic understanding of Communication and professional communication |
| **CO2** | Basic knowledge of structural and functional Grammar. Learning language through literature. |
| **CO3** | Basic tools of communication and improvement in communicative competence. |
| **CO4** | Understanding the basic grammar and basic structure of language. |
| **CO5** | Students will gain a fundamental understanding of the nature, branches, and history of Linguistics. |

| **Unit No.** | **Title of the Unit** | **Content of Unit** | **Contact Hrs.** | **Mapped CO** |
|---|---|---|---|---|
| 1 | **Professional Communication** | Professional Communication: Its Importance, Essentials of Effective Meaning and Communication, Barriers to Effective Communication. | 8 | 1 |
| 2 | **Language through Literature** | A. Essays: 1. The Effect of Scientific Temper on Man by Bertrand Russell, 2. The Aim ofScience and Humanities by Moody E Prior. B. 1. The Meeting Pool by Ruskin Bond, 2. The Portrait of a Lady by Khushwant Singh | 8 | 2 |
| 3 | **Basic Vocabulary** | Euphemism, One-word Substitution, Synonyms, Antonyms, Homophones, Idioms and Phrases, Common Mistakes, Confusable Words and Expressions. | 8 | 3 |
| 4 | **Basic Grammar** | Articles, Prepositions, Tenses, Concord, (Subject-Verb agreement), Modal Auxiliaries, Verbs: its Kinds and uses, Degrees of Comparison, Punctuation | 8 | 4 |
| 5 | **Language and Linguistics** | Language: Definition, characteristics and importance of Language Linguistics: Definition, nature, scope, branches, levels and types of Linguistics, Linguistics versus Traditional Grammar. | 8 | 5 |

| **Reference Books:** |
|---|
| Effective Communication Skills |
| Improve Your Communication Skills |
| Communication Skills Training |
| **e-Learning Source:** |
| www.ignou.com |
| www.swayam.com |
| www.coursera.com |

| | **Course Articulation Matrix: (Mapping of COs with POs and PSOs)** | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **PO-PSO CO** | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 |
| **CO1** | 3 | 3 | 2 | 3 | 3 | - | - | 2 | 3 | 3 | 2 | - |
| **CO2** | 2 | 3 | 1 | 2 | 3 | - | - | 2 | 3 | 3 | 1 | - |
| **CO3** | 1 | 3 | 1 | 2 | 3 | - | - | 3 | 3 | 2 | 2 | - |
| **CO4** | 3 | 3 | 2 | 2 | 3 | - | - | 2 | 2 | 3 | 1 | - |
| **CO5** | 2 | 3 | 2 | 3 | 3 | - | - | 3 | 3 | 2 | 3 | - |

**1- Low Correlation; 2- Moderate orrelation; 3- Substantial Correlation**

| | |
|---|---|
| **Name & Sign of Program Coordinator** | **Sign & Seal of HoD** |

**Integral University, Lucknow**

| **Effective from Session:** 2022-2023 | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Course Code** | Z020201/NS110 | **Title of the Course** | First Aid and Health | **L** | **T** | **P** | **C** |
| **Year** | First | **Semester** | Second | **2** | **0** | **0** | **2** |
| **Pre-Requisite** | 10+2 | **Co-requisite** | - | | | | |
| **Course Objectives** | This course aims to educate fundamental and essential understanding of first aid and sex education. | | | | | | |

| **Course Outcomes** | |
|---|---|
| **CO1** | Learn the skill needed to assess the ill or injured person and learn the skills to provide CPR to infants, children and adults. |
| **CO2** | Learn the skills to handle emergency child birth and learn the Basic sex education help young people navigate thorny questions responsibly and with confidence. |
| **CO3** | Learn the Basic sex education help youth to understand Sex is normal. It's a deep, powerful instinct at the core of our survival as a species. Sexual desire is a healthy drive. |
| **CO4** | Help to understand natural changes of adolescence |
| **CO5** | Learn the skill to identify Mental Health status and Psychological First Aid |

| **Unit No.** | **Title of the Unit** | **Content of Unit** | **Contact Hrs.** | **Mapped CO** |
|---|---|---|---|---|
| 1 | Fundamentals of First Aid-I | A. Basic First Aid<br>• Aims of first aid & First aid and the law.<br>• Dealing with an emergency, Resuscitation (basic CPR).<br>• Recovery position, Initial top to toe assessment.<br>• Hand washing and Hygiene<br>• Types and Content of a First aid Kit<br>B. First AID Technique<br>• Dressings and Bandages.<br>• Fast evacuation techniques (single rescuer).<br>• Transport techniques.<br>C. First aid related with respiratory system<br>• Basics of Respiration<br>• No breathing or difficult breathing, Drowning, Choking, Strangulation and hanging,<br>• Swelling within the throat, Suffocation by smoke or gases and Asthma.<br>D. First aid related with Heart, Blood and Circulation<br>• Basics of The heart and the blood circulation.<br>• Chest discomfort, bleeding.<br>E. First aid related with Wounds and Injuries<br>• Type of wounds, Small cuts and abrasions<br>• Head, Chest, Abdominal injuries<br>• Amputation, Crush injuries, Shock<br>F. First aid related with Bones, Joints Muscle related injuries<br>• Basics of The skeleton, Joints and Muscles.<br>• Fractures (injuries to bones). | 8 | 1,2 |
| 2 | Fundamentals of First Aid-II | G. First aid related with Nervous system and Unconsciousness<br>• Basics of the nervous system.<br>• Unconsciousness, Stroke, Fits – convulsions – seizures, Epilepsy.<br>H. First aid related with Gastrointestinal Tract<br>• Basics of The gastrointestinal system.<br>• Diarrhea, Food poisoning.<br>I. First aid related with Skin, Burns<br>• Basics of The skin.<br>• Burn wounds, Dry burns and scalds (burns from fire, heat and steam).<br>• Electrical and Chemical burns, Sun burns, heat exhaustion and heatstroke.<br>• Frost bites (cold burns), Prevention of burns, Fever and Hypothermia.<br>J. First aid related with Poisoning<br>• Poisoning by swallowing, Gases, Injection, Skin<br>K. First aid related with Bites and Stings<br>• Animal bites, Snake bites, Insect stings and bites<br>L. First aid related with Sense organs<br>• Basic of Sense organ.<br>• Foreign objects in the eye, ear, nose or skin.<br>• Swallowed foreign objects.<br>M. Specific emergency satiation and disaster management<br>• Emergencies at educational institutes and work<br>• Road and traffic accidents.<br>• Emergencies in rural areas.<br>• Disasters and multiple casualty accidents.<br>• Triage.<br>• Emergency Child birth | 8 | 2.3 |
| 3 | Fundamentals of Sex Education-I | Basic Sex Education<br>• Overview, ground rules, and a pre-test<br>• Basics of Urinary system and Reproductive system.<br>• Male puberty — physical and emotional changes | 7 | 4 |

| | | | | |
|---|---|---|---|---|
| | | • Female puberty — physical and emotional changes<br>• Male-female similarities and differences<br>• Sexual intercourse, pregnancy, and childbirth<br>• Facts, attitudes, and myths about LGBTQ+ issues and identities<br>• Birth control and abortion<br>• Sex without love — harassment, sexual abuse, and rape<br>• Prevention of sexually transmitted diseases. | | |
| 4 | Fundamentals of Sex Education-II | • Mental Health and Psychological First Aid<br>• What is Mental Health First Aid?<br>• Mental Health Problems in the India<br>• The Mental Health First Aid Action Plan<br>• Understanding Depression and Anxiety Disorders<br>• Crisis First Aid for Suicidal Behavior & Depressive symptoms<br>• What is Non-Suicidal Self-Injury?<br>• Non-crisis First Aid for Depression and Anxiety<br>• Crisis First Aid for Panic Attacks, Traumatic events<br>• Understanding Disorders in Which Psychosis may Occur<br>• Crisis First Aid for Acute Psychosis | 7 | 5 |

| **Reference Books:** |
|---|
| Indian First Aid Mannual-https://www.indianredcross.org/publications/FA-manual.pdf |
| Red Cross First Aid/CPR/AED Instructor Manual |
| https://mhfa.com.au/courses/public/types/youthedition4 |
| Finkelhor, D. (2009). The prevention of childhood sexual abuse. Durham, NH: Crimes Against Children Research Center. |
| Orenstein, P. (2016). Girls and sex: Navigating the complicated new landscape. New York, NY: Harper. |
| **e-Learning Source:** |
| https://www.redcross.org/take-a-class/first-aid/first-aid-training/first-aid-online |
| www.unh.edu/ccrc/pdf/CV192. pdf |
| https://www.firstaidforfree.com/ |
| https://www.coursera.org/learn/psychological-first-aid |
| https://www.coursera.org/learn/mental-health |

| | **Course Articulation Matrix: (Mapping of COs with POs and PSOs)** | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **PO-PSO CO** | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 |
| **CO1** | 3 | 1 | - | - | - | - | - | 2 | - | - | 2 | 1 |
| **CO2** | 1 | 3 | - | - | - | - | - | 2 | - | - | 3 | 3 |
| **CO3** | 2 | 3 | - | - | - | - | - | 3 | - | - | 2 | 2 |
| **CO4** | 3 | 2 | - | - | - | - | - | 1 | - | - | 3 | 3 |
| **CO5** | 3 | 3 | - | - | - | - | - | 3 | - | - | 2 | 3 |

**11- Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation**

| | |
|---|---|
| **Name & Sign of Program Coordinator** | **Sign & Seal of HoD** |