# Multidisciplinary Course (MDC) - for UG Program

| | |
|---|---|
| **Title of the Course:** | **Environmental Physics** |
| **IDC Minor Paper Code:** | |
| **Semester - 2** | |
| | **Credit - 3** |
| **Objectives of the Course:** | • To gain a foundational understanding of key physical principles related to environmental science, including energy transfer, thermodynamics, and wave mechanics.<br>• To study the physical processes governing environmental systems, such as climate dynamics, water cycles, and atmospheric phenomena.<br>• To explore various energy sources, including fossil fuels and renewables, and understand their environmental impacts and efficiencies<br>• To gain insights into physics of plant-soil-water interface determining ecosystem processes<br>Theory.<br>• To study the physics of resource management, including water, soil, and minerals, and evaluate sustainable practices. |
| **Learning Outcomes of the Course** | After studying this course, students will be able to -<br>• Apply principles of physics to manage natural resources in extreme environment.<br>• Evaluate different energy sources and their environmental impacts, including renewable and non-renewable options.<br>• Assess the sources, effects, and control measures of pollution, and propose solutions based on physical principles.<br>• Integrate physics principles into sustainability practices and contribute to efforts aimed at promoting sustainable development. |
| **Course Content** | |
| **Module: 1** | **Chapter 1a: Laws of Physics and Human Environment**<br>First, second and third law of thermodynamics, laws of thermodynamics and the human body, energy and metabolism, energy transfers, convection, Newton's law of cooling, survival in cold climates, survival in hot climates etc.<br>**Chapter 1b: Atmosphere, Ocean and radiation**<br>Atmosphere temperature, pressure, circulation, precipitation and other |

| | |
|---|---|
| | features, atmospheric aerosol, photochemical pollution, ozone, ozone hole, ozone in polar region, oceanic waves and circulation, radiation, terrestrial radiation, earth as a black body, greenhouse effect, global warming. Remote sensing and its application in environmental monitoring and management. |
| **Module: 2** | **Chapter 2a: The Physics of water, wind and solids**<br>Hydrosphere, water in the atmosphere, physics of cloud formation, thunderstroms, physics of wind creation, principal forces acting on air masses- gravitational force, coriolis force, frictional force etc. , cyclones and anticyclones, global convection, global wind patterns, soil and hydrologic cycle, surface tension and soils, soil temperature and heat flow etc.<br><br>**Chapter 2b: Ecophysics**<br>Solid-plant-water relations, water entry into soil, water and energy balance, plant uptake and water use efficiency, Macroscopic flow o matter and energy etc. |
| **Module: 3** | **Chapter 3a: Energy resources for mankind**<br>Fossil fuels, nuclear power, renewable and sustainable energy resources- hydroelectric power, tidal power, wind power, ocean power, biomass, solar power, solar photovoltaic; energy demand and conservation of energy, use of green energy and sustainable energy resources etc.<br>**Chapter 3b: Environment pollution and sustainable development**<br>Water pollution, air pollution, soil pollution, noise pollution etc, pollution controls and acts, pollution and human health, green city, space environment, environmental safety measures etc. |
| **Suggestive Readings:** | 1. Mason, N & Hughes, P. 2001. : Introduction to Environmental Physics: Planet Earth, Life and Climate, Taylor and Francis<br>2. Boeker, E. & Grondelle, R. 2011. Environmental Physics: Sustainable Energy and Climat Change. Wiley.<br>3. Borghese, F., Denti, P. and Saija, R., 2007. Scattering from Model Nonspherical Particles: Theory and Applications to Environmental Physics. Springer Science & Business Media.<br>4. Forinash, K. 2010. Foundation of Environmental Physics. Island Press.<br>5. Monteith, J. and Unsworth, M., 2013. Principles of Environmental Physics: Plants, Animals, and the Atmosphere. Academic Press.<br>6. Smith, C., 2004. Environmental Physics. Routledge. |
| **Method of Assessment, Measurement, &** | |

| | |
|---|---|
| **Evaluation:** | |
| **Method of Internship, Apprenticeship, Project, Community Engagement:** | |