SYLLABUS & PROGRAMME STRUCTURE OF
FOUR YEARS UNDERGRADUATE
PROGRAMME

ENVIRONMENTAL SCIENCE

(Minor)

Under National Education Policy – 2020

(Effective from the Academic Session 2023-2024)

MAHARAJA BIR BIKRAM UNIVERSITY
AGARTALA, TRIPURA: 799004

Syllabus for Undergraduate Course
Under NEP 2020
First Semester (4 credits)
Total Marks 100

Course I: FUNDAMENTALS OF ENVIRONMENTAL SCINECE

COURSE OBJECTIVES:

To Study:

1. Origin and Evolution of Earth
2. Ecosystem Dynamics
3. Natural Resources and their Management
4. Biodiversity and their Conservation

COURSE CODE: ENSG - 1(TH) (3 Credits)

COURSE OUTCOME: After successful completion of the course, the students will develop following attribute.

COURSE OUT COME	ATTRIBUTES
CO1	Students will be acquainted with history of earth and begging of life on earth. They will also gain knowledge on structure and function of ecosystem.
CO2	They will know natural resources, their use and management.
CO3	They will learn the importance of biodiversity. They will also learn the sustainable use and protection of biodiversity

Unit wise detail content

Unit 1	16 hours	Title of Unit: Origin and Evolution of Earth

Formation of the Earth: Formation and composition of Core, Mantle, Crust, Atmosphere and Hydrosphere, Chemical composition of Earth, Geological time scale and major changes on the Earth's surface. Movement of lithosphere plates: Mantle convection and Plate tectonics, Earthquakes, Volcanic activities, Orogenesis, Isostasy, Continental drift, Pangaea and present- day continents, Paleontological evidences of evolution of life on earth.

Unit 2	**16 hours**	**Title of Unit: Ecosystem Dynamics**
Definition and types of Ecosystems, Biotic and Abiotic components of Ecosystem, Ecological amplitude, Liebig's Law of the Minimum, Shelford's Law of Tolerance, Ecosystem metabolism, primary production and models of energy flow, secondary production and Trophic Efficiency, Food chain, Food web, Detritus pathway of energy flow and decomposition processes, Ecological efficiencies, Ecological pyramids, Cybernetic nature of Ecosystem.		
Unit 3	**16 hours**	**Title of Unit: Natural resources and their Management**
Classification of natural resources: Renewable and Non-renewable resources, Overexploitation of forest resources and management strategies, Sustainable forestry, Water resources: Water conservation strategies, Soil as a resource: Soil conservation strategies, Food resources, Mineral resources, Mining: Surface, Sub-surface, Open-pit, Dredging, Strip, Environmental effects of Mineral exploration. Occupational health. Environment and Public Health in Contemporary Society		
Unit 4	**16 hours**	**Title of Unit: Biodiversity and their Conservation**
Biodiversity: Hierarchical levels (Genetic diversity, Species diversity, Ecosystem diversity), Latitudinal Gradients of biodiversity, Biodiversity as a resource, Productive and consumptive values, Causes of biodiversity loss, Rare, Threatened and Endangered flora and fauna, Concept of Endemism and Invasive species, Biodiversity Hotspots of India, Strategies for Biodiversity Conservation, Ex-situ, In-situ strategies (Wild life sanctuaries, National Parks and Biosphere reserves, Gene bank and Seed bank), Biodiversity documentation, Convention on Biological Diversity, Role of local communities and Traditional Knowledge in conservation.		

Suggested Reading:

1. Allaby, M. (2002). Basics of Environmental Science. Routledge.
2. Barry, G. R. and Chorley, J. R. (2003). Atmosphere, Weather and Climate. Routledge, London.
3. Critchfield, H. J. (1995). General Climatology. Printice Hall of India.
4. Horne, A. J., & Goldman, C. R. (1994). Limnology (Vol. 2). New York: McGraw-Hill.
5. Lutgens, F. K. and Tarbuck, E. J. (1982). Atmosphere Introduction to Meteorology. Prentice Hall Inc.
6. Manahan, S. E. (2011). Fundamentals of environmental chemistry. CRC press.
7. Miller, G. T., & Spoolman, S. (2015). Environmental Science. Cengage Learning.

8. Miller, Jr. G. T. (1994). Living in the Environment: Principles, Connections and Solutions. Wadsworth Publishing Co.
9. Miller, R. W. and Donahue, R. L. (1992). Soils Introduction to Soils and Plant Growth. Prentice Hall of India.
10. Mitra, A., & Chaudhuri, T. R. (2020). Basics of Environmental Science. New Central Book Agency.
11. Nandini, N. (2019). A text book on Environmental Studies (AECC). Sapna Book House, Bengaluru.
12. Wright, R. T. (2007). Environmental science: toward a sustainable future. Jones & Bartlett Publishers.

COURSE CODE: ENSG - 1(PR) (1 Credit)

COURSE OUTCOME: After successful completion of the course, the students will develop following attribute.

COURSE OUT COME	ATTRIBUTES
CO1	Students will be able to identify various rocks & minerals and method of their formation.
CO2	They will be able to estimate the population size of flora and fauna of vegetation.
Detail content of Practical	
1. Identification of Rocks and Minerals. 2. Identification and submission of report on Non-Timber Forest Products. 3. Preparation of model on Earth processes. 4. Preparation of land use map of an area. 5. Visit to Biodiversity Conservation site and preparation of report. 6. Preparation of Herbarium and preparation of Geo-tagged Vegetation map.	

Suggested reading:

1. Nandini, N. (2009). Handbook on water quality monitoring and Assessment. Sapna Book House, Bengaluru.

2. Sawyer, C. N. and Mc Carty, P. L. (1978). Chemistry for Environmental Engineering. Mc Graw Hill International.
3. Saxena M M. (1990). Environmental Analysis: Water, Soil and Air. Edition, 2. Publisher, Agro Botanical Pub.
4. Standard Methods for Examination of Water and Wastewater. (2017). APHAWEF.
5. Trivedi, P. K. and Goel, P. K. (1984). Chemical and Biological Methods of Water Pollution Studies. Environmental Publication.
6. Zhang, C. (2007). Fundamentals of environmental sampling and analysis. John Wiley & Sons.