INSTITUTE	**FACULTY OF SCIENCE**
PROGRAM	**BACHELOR OF SCIENCE (MICROBIOLOGY)**
SEMESTER	**3**
COURSE TITLE	**ENVIRONMENTAL STUDIES**
COURSE CODE	**02ES0310**
COURSE CREDITS	**4**

Objective:

1 Students should gain basic understanding of environment and environmental issues.

Course Outcomes: After completion of this course, student will be able to:

1 Understand multi-disciplinary nature of the environment, its components, and inter-relationship between man and environment.

2 Understand the relevance and importance of the natural resources in the sustenance of life on earth and living standard.

3 Comprehend the importance of ecosystem, biodiversity and natural bio geo chemical cycle.

4 Apply the knowledge of environment in daily life and find solution for problems related to Environment pollution.

Pre-requisite of course:N/A

Teaching and Examination Scheme

Theory Hours	Tutorial Hours	Practical Hours	ESE	IA	CSE	Viva	Term Work
3	0	2	50	30	20	25	25

Contents : Unit	Topics	Contact Hours
1	**Introduction to Environment and Environmental Studies** Definition and Components of Environment, Relationship between the different components of Environment, Man and Environment relationship, Impact of technology on Environment, Environmental Degradation, Multidisciplinary nature of the Environmental studies, Sustainable Development, Sustainable Development Goals, Importance of Environmental Education	10
2	**Ecology and Ecosystems** Introduction: Ecology- Objectives and Classification, Concept of an ecosystem- structure and functions of ecosystem, Components of ecosystem- Producers, Consumers, Decomposers, Bio-Geo-Chemical Cycles- Hydrologic Cycle, Carbon cycle, Energy Flow in Ecosystem, Food Chains, Food webs, Ecological Pyramids, Major Ecosystems: Forest Ecosystem, Grassland Ecosystem, Desert Ecosystem, Aquatic Ecosystem, Estuarine Ecosystem.	12

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Contents : Unit	Topics	Contact Hours
3	**Natural Resources** Renewable and Non-renewable resources, exploitation and conservation, Role of individual in conservation of natural resources. Water resources: Water sources- Surface and Ground water sources, Indian and Global scenario. Forest resources: Definition and Classification of Forests, Ecological and Economic importance and benefits of forest, Deforestation: causes and effects, remedial measures. Food resources: Sources of food, Global and Indian food demand scenario, Environmental effects of Agriculture.	12
4	**Pollution, Population & Environment** a. Factors governing human settlement, Population Growth, Population Explosion and Overpopulation: Cause, Effects & Control strategies, Demographic Transition, Population Forecasting methods b. Water & Air Pollution: Classification, Source, Effects & Control measures c. Marine and Thermal Pollution- Sources, Effects and control d. Land & Noise Pollution: Definitions, Causes, Effects & Control e. E-Waste: Source, Control Strategies, E-waste rules	10
Total Hours		**44**

Suggested List of Experiments:

Contents : Unit	Topics	Contact Hours
1	**Experiments** Model Preparation for components of environment., Model Preparation for structure and function of ecosystem, Determination of pH, Conductivity for a given water sample., Determination of Total Solids, Total suspended solids, Total Dissolved solids in waste water sample., Determination of Turbidity, alkalinity and acidity of given sample., Determine Total Hardness, Calcium Hardness and Magnesium hardness from given water samples, Determine Chloride from given water/wastewater samples., Determination of DO from water/wastewater samples., Introduction to application of spectrophotometer in environmental monitoring, Application of Fine Dust sampler in ambient air sampling, Demonstration of E-waste management method., Visit to Sewage treatment plant and Vermicomposting plant	16
Total Hours		**16**

Textbook :

1 Textbook of Environmental Studies for Undergraduate Courses, Erach Bharucha , Universities Press (India) Private Ltd, 2013

2 Textbook of Environment and Ecology, Vir Singh , Springer, 2024

3 A Text Book Of Environmental Chemistry, Dara S.S., Mishra D.D. , S Chand & Company, 2004

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References:

1 Basics of Environmental Studies , Basics of Environmental Studies , N S Varandani, LAP - Lambert Academic Publishing, 2013

2 Basics of Environmental Studies , Basics of Environmental Studies , U K Khare, Tata McGraw Hill, 2011

3 Environmental Science A Global Concern , Environmental Science A Global Concern , William P. Cunningham & Mary Ann Cunningham, Tata Mc Graw Hill, 2009

Suggested Theory Distribution:

The suggested theory distribution as per Bloom's taxonomy is as follows. This distribution serves as guidelines for teachers and students to achieve effective teaching-learning process

Distribution of Theory for course delivery and evaluation					
Remember / Knowledge	**Understand**	**Apply**	**Analyze**	**Evaluate**	**Higher order Thinking / Creative**
20.00	30.00	25.00	15.00	10.00	0.00

Instructional Method:

1 The course delivery method will depend upon the requirement of content and need of students. The teacher in addition to conventional teaching method by black board, may also use any of tools such as demonstration, role play, Quiz, brainstorming, MOOCs etc.

2 The internal evaluation will be done on the basis of continuous evaluation of students in the laboratory and class-room.

3 Practical examination will be conducted at the end of semester for evaluation of performance of students in laboratory.

4 Students will use supplementary resources such as online videos, NPTEL videos, e-courses, Virtual Laboratory

Supplementary Resources:

1 https://onlinecourses.nptel.ac.in/noc23_hs155/preview

2 https://onlinecourses.swayam2.ac.in/cec19_bt03/preview

3 https://onlinecourses.nptel.ac.in/noc20_ge16/preview

4 https://www.coursera.org/courses?query=environmental%20studies

5 https://www.youtube.com/watch?v=PwmSa09Cl6E

6 https://www.youtube.com/watch?v=wFtsKLubCnc

7 https://www.youtube.com/watch?v=PpLgcqOBvS4&list=PLysZquKdjuWT3VjWs-c8CKNf7hPVZp0ZS

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