FORM -2.6

BIoE/CSE/CP/2023-24/REV: 00

BETHLAHEM INSTITUTE OF ENGINEERING
KARUNGAL

Department of Computer Science and Engineering

2.6 COURSE PLAN

Name of the Staff : **A.Little Mary**

Designation & Dept. : **Assistant Professor, Chemistry**

Program : **B.E / CSE**

Course Code &Title : **GE3451, ENVIROMENTAL SCIENCES AND SUSTAINABILITY**

Year / Semester : **II / Fourth**

1. Vision & Mission of the Program

VISION:-

To create technically proficient IT professionals in the field of Information Technology

MISSION:-

To provide quality technical education by adopting a learner-centric approach in order to strengthen the technical skills among the students

2. Program Educational Objectives (PEOs)

PEO1. Graduates shall have good communication skills, possess ethical conduct, sense of responsibility to serve the society and protect the environment.

PEO2.Graduates shall have good communication skills, possess ethical conduct, sense of responsibility to serve the society and protect the environment.

PEO3. Graduates shall possess academic excellence with innovative insight, soft skills, managerial skills, leadership qualities, Knowledge of contemporary issues and understand the need for lifelong learning for a successful professional career.

3. Program Outcomes (POs)

Engineering Graduates will be able to:

1. Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

2. Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

3. Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

4. Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

5. Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

6. The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

7. Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

9. Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

11. Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

12. Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

4. Program Specific Outcomes (PSOs) :-

PSO 1: To apply the knowledge of basic sciences and fundamentals of engineering to conceptualize, design, model and manufacture automotive systems / processes.

PSO 2: To use the advanced engineering tools in design engine chassis and drive train system.

PSO 3: To lead professionally in an industrial environment by applying managerial skills to improve performance and safety through proper maintenance of automobiles.

5. Course Outcomes (COs)

Students will be able to

CO 1: Gain knowledge to protect environment and minimize environmental pollution.

CO 2: Create an awareness about value of environment at infant stage.

CO 3: Eradicate ignorance, incomplete knowledge and misconceptions about environment.

CO 4: Lead a life style that would reduce environmental disasters.

CO 5: Understand the importance of clean environment and a healthy society.

6. Mapping of COs, POs & PSOs

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O 3
CO 1	-	-	2	-	-	2	3	-	2	3	-	-	1	-	-
CO 2	2	-	2	-	2	-	-	-	-	-	-	1	-	1	-
CO 3	-	-	-	2	2	-	**2**	-	-		-	-	-	1	-
CO 4	-	-	-	-	-	-	2	-	-	2	2	-	-	-	1
CO 5	-	-	-	-	-	2	2		-	-	1	2	-	-	1

3 - High 2 – Medium 1 – Low

JUSTIFICATION FOR CORRELATION

Sl. No	Related POs	Justification
CO1	PO3 PO6 PO7 PO9 PO10	3. Can apply the knowledge of science to conserve biodiversity. 6. Can develop measures to conserve and protect the endemic species. 7. Ability to device plans to minimize the threats to biodiversity. 9. Can suggest individual opinions to conserve the extinct species. 10. Can propose a check list on the extinct species of fauna and flora.
CO2	PO1 PO3 PO5 PO12	1. Can assess the pollution status of air, water and land using scientific methods and scientific tools. 3. Can develop strategies to bring down pollution. 5. Understands the use of modern devices and engineering ideas to minimize pollution. 12. Will be able to work consistently for a pollution-free world.
CO3	PO4 PO5 PO7	4. Develops an attitude to act for energy management. 5. Understands the need for new energy sources. 7. Practices the ways to switch-on to renewable sources of energy.
CO4	PO7 PO10 PO11	7. Develops an attitude towards sustainable development. 10. Can fight against climatic change for protection of nature as individual/group. 11. Can devise projects that would enable towards environmental management.
CO5	PO6 PO7 PO11 PO12	6. Understands about the need for a sustainable habitat. 7. Realizes the need for sustainable energy. 11. Recognises the importance of Green Engineering. 12. Can work for socio-economical & technological changes

JUSTIFICATION FOR CORRELATION

Sl. No	Related PSOs	Justification
CO 1	PSO1	1. Ability to sort data of biodiversity form available apps.
CO 2	PSO2	2. Ability to express novel ideas for pollution control.
CO 3	PSO2	2. Propose ideas related to sustainable development.

CO 4	PSO3	3.Can contribute to bring down climatic change.
CO 5	PSO3	3. Create ideas for green engineering & technological changes.

7. Pre-requisite

Basic ideas about environmental pollution from school-level topics and Engineering chemistry syllabus.

8. Course Description

The course describes about nature's biodiversity and facts about the environment. It also helps to study the interrelationship between living organism and the environment. The course gives a clear picture of the available natural resources and the need to protect and conserve them for the attainment of a sustainable future. It also refers to the need of a healthy society which is based on human values as a valid message for the present and future generation.

9. Lesson Plan

Lecture No.	Topic(s) to be covered	Text / Ref. Book	Teaching Mode	No. of Hours	Cumulative Hours
Unit – 1 ENVIRONMENT AND BIODIVERSITY					
1	Scope and importance of environment.	T1	CTL	1	1
2	Ecosystem, Energy flow, Ecological succession	T1	CTL	1	2
3	Types & Values of biodiversity	T1	PPT	1	3
4	Threats to biodiversity		CTL	1	4
5	Man wild life conflicts	T1	CTL	1	5
6	Conservation of biodiversity In-situ & ex-situ	T1	CTL	1	6
7	Revision & Unit Test	-	CTL	1	7
Unit – II ENVIRONMENTAL POLLUTION					
1	Effects of Air & Water pollution	R2, R3	PPT	1	8
2	Effects of Soil & Marine pollution	R2, R3	CTL	1	9
3	Effects of Air pollution	R2, R3	CTL	1	10
4	Noise pollution – Causes & Effects	R2, R3		1	11
5	Soil waste management	R2, R3, T2	CTL	1	12
6	OHASMS, Environmental Pollution Acts	R2, R1, O1	CTL	1	13
7	Revision & Unit Test	-	CTL	1	14
Unit – III RENEWABLE SOURCES OF ENERGY					
1	Energy Management & Conservation	O1	CTL	1	15
2	Types of new energy sources	O1	FL	1	16
3	Applications of H_2 energy	O1	CTL	1	17
4	Ocean energy resources	O1	CTL	1	18
5	Tidal energy conservation	O1	PPT	1	19

6	Geothermal energy	O1	CTL	1	20
7	Revision & Unit Test	-	CTL		21
Unit – IV SUSTAINABILITY AND MANAGEMENT					
1	GDP & Sustainability	R3	CTL	1	22
2	Sustainable development goals	R3	PPT	1	23
3	Climate change – Global, Regional& Local issues	T1	CTL	1	24
4	Concept of carbon credit	T1, R3	FL	1	25
5	Carbon foot print	T1, R3	CTL	1	26
6	Environmental management in industry	T1, R3	CTL	1	27
7	Revision & Unit Test	-	CTL	1	28
Unit – V SUSTAINABILITY PRACTICES					
1	Zero waste & R-concept	O1, O2	FL	1	29
2	Environmental Impact Assessment	O1	CTL	1	30
3	Sustainable Habitat	O1, O2	CTL	1	31
4	Sustainable Energy	O1	CTL	1	32
5	Carbon cycle, emission & sequestration	O1	CTL	1	33
6	Green Engineering	O1	PPT	1	34
7	Revision & Unit Test	-	CTL	1	35

10. List of Text Books by AU:

T1. Benny Joseph,'Environmental Science & Engineering',Tata McGraw-Hill, New Delhi,2006
T2. Gilbert M.Masters, 'Introduction to Environmental Engineering and Science', 2nd edition, Pearson Education, 2004.

11. Reference Books by AU:

R1. Dharmendra S. Sengar,'Environmental law', Prentice hall of India Pvt. Ltd,New Delhi,2007
R2. Erach Bharucha, "Textbook of Environmental Studies", University Press(I) PVT, LTD,2015
R3. Rajagopalan, R,'Environmental Studies-From Crisis to Cure',Oxford University Press, 2005
R4. G. Tyler Miller and Scott E. Spoolman, "Environmental Science", Cengage Learning India PVT, LTD, Delhi, 2014.

12. Other related books from Library:

O1. Dr. Ravikrishnan 'Environmental Sciences & Sustainability.'
O2. Richard. T. Wright 'Environmental Science and Engineering'.

13. Web Resources:

Unit	Topic	Web Link
I	Ecosystem	https://www.conserve-energy-future.com/what-is-an-ecosystem.php

II	Air pollution	https://www.conserve-energy-future.com/causes-effects-solutions-of-air-pollution.php
III	Hydrogen energy	https://h2tools.org/bestpractices/hydrogen-applications https://www.iea.org/reports/the-future-of-hydrogen
IV	Carbon footprint	https://www.conservation.org/stories/what-is-a-carbon-footprint https://www.nytimes.com/guides/year-of-living-better/how-to-reduce-your-carbon-footprint
V	Sustainable habitat	https://www.slideshare.net/Aduu7/sustainable-habitat

14. Video Resources:

Sl. No	University	Website	Video Link
V1	IIT Kharagpur	NPTEL	Environmental Issues https://nptel.ac.in/courses/123/105/123105001/
V2	IIT Roorkee	NPTEL	Renewable Energy https://nptel.ac.in/courses/103/107/103107157/

15. Assignments

Sl. No.	COs	Topic
1	CO1	Conservation of biodiversity
2	CO2	Solid waste management
3	CO3	Hydrogen economy
4	CO4	Carbon footprint
5	CO5	Green engineering

16. Content Beyond Syllabus

Details of content beyond the syllabus for attainment of Cos/POs/PSOs:

Sl. No	Gap Identified	Contents/ Activity to bridge the gap	Method of Implementation (Seminar / Guest Lecture/Workshop etc.)	No. of Periods	Mapping to COs	Mapping to POs	Mapping to PSOs
1	Design/ Development of solutions	Wind energy	Seminar	1	CO3	PO3	PSO1
2	Environment and Sustainability	Green atom concept	Seminar	1	CO5	PO7	PSO3

Proof has to be retained for verification

JUSTIFICATION FOR CORRELATION

Contents/Activity to bridge the gap	Related COs, POs & PSOs	Justification
Wind Energy & Green atom concept.	CO3, CO5	Ability to propose easy methods for renewable energy.
	PO7	Students gain the idea towards sustainable development.
	PSO3	Develops projects and solutions for the energy needs of society.

17. Journal Links:

Sl. No	Journal Name	Publisher	Link
1.	Science Direct	Elsevier	https://doi.org/10.1016/j.envpol.2022.120401
2.	Environmental Science and Pollution Research	Springer	https://doi.org/10.1007/s11356-022-23548-x
3.	Environmental Science and Pollution Research	Springer	https://doi.org/10.1007/s11356-022-20109-0
4.	International Journal of Sustainable Development	Inderscience	https://doi.org/10.1504/IJSD.2022.127945

18. Assessment Methodology

Assessment	Topic	CO	Marks

IAT-1	Unit 1& Unit 2	CO1 CO2	50 50
IAT-2	Unit 3 & Unit 4	CO3 CO4	50 50
Model Test	Unit 1- Unit 5	CO1 CO2 CO3 CO4 CO5	16 16 16 16 16
Assignment	Unit 1- Unit 5	CO1 CO2 CO3 CO4 CO5	20 20 20 20 20
Slip Test	Unit 5	CO5	40

Course In-charge **Verified by** (ACADEMIC RESOURCE CELL MEMBER) **HoD** **Principal**