

MOHAMMED SATHAK A J COLLEGE OF ENGINEERING

Siruseri IT park, OMR, Chennai - 603103

LESSON PLAN							
Department of Civil Engineering							
Name of the Subject	Environmental Sciences and Sustainability			Name of the handling Faculty	Dr R Someswaran		
Subject Code	GE3451			Year / Sem	II Year / IV Semester		
Acad Year	2022-2023			Batch	2021 - 2025		
Course Objective							
•To introduce the basic concepts of environment, ecosystems and biodiversity and emphasize on the biodiversity of India and its conservation.							
• To impart knowledge on the causes, effects and control or prevention measures of environmental pollution and natural disasters.							
• To facilitate the understanding of global and Indian scenario of renewable and non-renewable resources, causes of their degradation and measures to preserve them.							
• To familiarize the concept of sustainable development goals and appreciate the interdependence of economic and social aspects of sustainability, recognize and analyse climate changes, concept of carbon credit and the challenges of environmental management.							
• To inculcate and embrace sustainability practices and develop a broader understanding on green materials, energy cycles and analyse the role of sustainable urbanization.							
Course Outcome							
At the end of the course, the students will be able to,							
CO1 - Explain the functions of environment, ecosystems and biodiversity and their conservation.							
CO2 - Discuss the causes, effects of environmental pollution and natural disasters and contribute to the preventive measures in the society.							
CO3 - Define renewable energy sources and its applications in sustainable development.							
CO4 - Differentiate between sustainable and unsustainable development and explain the impacts of climate change.							
CO5 - Demonstrate the sustainable practices, explain green materials, energy cycles and the role of sustainable urbanization.							
Lesson Plan							
Sl. No.	Topic(s)	T / R*	Periods Required	Mode of Teaching (BB / PPT / NPTEL / MOOC / etc)	Blooms Level (L1-L6)	CO	PO
		Book					
UNIT I - ENVIRONMENT AND BIODIVERSITY							
1	Definition, scope and importance of environment, need for public awareness	T1/R5	1	BB	L1	CO1	PO2,PO3, PO6, PO7
2	Concept of an ecosystem	T1/R5	1	BB	L1	CO1	PO2,PO3, PO6, PO7
3	Energy flow, ecological succession.	T1/R5	1	BB	L1	CO1	PO2,PO3, PO6, PO9
4	Types of biodiversity: genetic, species and ecosystem diversity	T1/R5	1	BB	L1	CO1	PO2,PO3, PO6, PO7
5	Values of biodiversity, India as a mega-diversity nation	T1/R5	1	PPT	L1	CO1	PO2,PO3, PO6, PO7
6	Hot-spots of biodiversity – threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts	T1/R5	1	PPT	L1	CO1	PO2,PO3, PO6, PO7
7	Endangered and endemic species of India – conservation of biodiversity: In-situ and ex-situ	T1/R5	1	BB	L1	CO1	PO2,PO3, PO6, PO7
Suggested Activity: Assignment / Case Studies / Tuorials/ Quiz / Mini Projects / Model Developed/others Planned if any : Assignment							
Evaluation method							
Marks out of 10							
UNIT II - ENVIRONMENTAL POLLUTION							
8	Causes, effects and preventive measures of water soil pollution	T2/R4	1	BB	L1	CO2	PO2,PO3, PO6, PO7
9	Causes, effects and preventive measures of air and noise pollution	T1/R4	1	BB	L1	CO2	PO2,PO3, PO6, PO7
10	Solid, Hazardous waste management.	T1/R4	1	BB	L2	CO2	PO2,PO3, PO6, PO7
11	E-Waste management	T2/R4	1	BB	L2	CO2	PO2,PO3, PO6, PO7
12	Case studies on Occupational Health and Safety Management system (OHASMS).	T2/R4	1	PPT	L4	CO2	PO2,PO3, PO6, PO7
13	Environmental protection, Environmental protection acts	T2/R4	1	BB	L2	CO2	PO2,PO3, PO6, PO7
Suggested Activity: Assignment / Case Studies / Tuorials/ Quiz / Mini Projects / Model Developed/others Planned if any Case Study : Submit a report on Occupational Health and Safety Management system in an industry							
Evaluation method : Marks out of 10							
UNIT III - RENEWABLE SOURCES OF ENERGY							
14	Energy management and conservation	T2/R4	1	BB	L1	CO3	PO2,PO3, PO6, PO7
15	New Energy Sources: Need of new sources.	T2/R4	1	PPT	L2	CO3	PO2,PO3, PO6, PO7
16	Different types new energy sources	T1/R4	1	BB	L1	CO3	PO2,PO3, PO6, PO7

17	Applications of- Hydrogen energy	T1/R4	1	BB	L2	CO3	PO2,PO3, PO6, PO7
18	Ocean energy resources, Tidal energy conversion	T2/R4	1	PPT	L2	CO3	PO2,PO3, PO6, PO7
19	Concept, origin and power plants of geothermal energy.	T2/R4	1	PPT	L2	CO3	PO2,PO3, PO6, PO7
Suggested Activity: Assignment / Case Studies / Tuorials/ Quiz / Mini Projects / Model Developed/others Planned if any. Assignment							
Evaluation method Marks out of 10							
UNIT IV - SUSTAINABILITY AND MANAGEMENT							
20	Development , GDP	T2/R4	1	PPT	L2	CO4	PO2,PO3, PO6, PO7
21	Ustainability- concept, needs and challenges	T2/R4	1	BB	L2	CO4	PO2,PO3, PO6, PO7
22	Economic, social and Environmental aspects of sustainability	T2/R4	1	BB	L2	CO4	PO2,PO3, PO6, PO7
23	From unsustainability to sustainability-millennium development goals	T2/R4	1	PPT	L2	CO4	PO2,PO3, PO6, PO7
24	Sustainable protocols, Sustainable Development Goals targets	T2/R1	1	BB	L2	CO4	PO2,PO3, PO6, PO7
25	Sustainable indicators and intervention areas	T2/R4	1	BB	L2	CO4	PO2,PO3, PO6, PO7
26	Climate change- Global, Regional and local environmental issues and possible solutions-case studies	T2/R5	1	BB	L4	CO4	PO2,PO3, PO6, PO7
27	Concept of Carbon, Credit, Carbon Footprint. Environmental management in industry-A case study.	T2/R4	1	BB	L2	CO4	PO2,PO3, PO6, PO7
Suggested Activity: Assignment / Case Studies / Tuorials/ Quiz / Mini Projects / Model Developed/others Planned if any Case Study: Climate change and effects							
Evaluation method Marks out of 10							
UNIT V - SUSTAINABILITY PRACTICES							
28	Zero waste and R concept, Circular economy, ISO 14000 Series	T5/R4	1	PPT	L2	CO5	PO2,PO3, PO6, PO7
29	Material Life cycle assessment, Environmental Impact Assessment	T6/R4	1	PPT	L2	CO5	PO2,PO3, PO6, PO7
30	Sustainable habitat: Green buildings, Green materials, Energyefficiency, Sustainable transports.	T5/R4	1	BB	L2	CO5	PO2,PO3, PO6, PO7
31	Sustainable energy: Non-conventional Sources, Energy Cycles	T7/R4	1	BB	L2	CO5	PO2,PO3, PO6, PO7
32	carbon cycle, emission and sequestration,	T7/R4	1	PPT	L2	CO5	PO2,PO3, PO6, PO7
33	Green Engineering: Sustainable urbanization- Socio-economical and technological change	T5/R4	1	PPT	L2	CO5	PO2,PO3, PO6, PO7
Suggested Activity: Assignment / Case Studies / Tuorials/ Quiz / Mini Projects / Model Developed/others Planned if any Assignment							
Evaluation method Marks out of 10							
Content Beyond the Syllabus Planned							
1	Case studies related to the Industrial safety						
2	Marine Pollution						
3	Pollution in the space and solutions						
Text Books							
1	Anubha Kaushik and C. P. Kaushik's "Perspectives in Environmental Studies", 6th Edition, New Age International Publishers, 2018.						
2	Benny Joseph, 'Environmental Science and Engineering', Tata McGraw-Hill, New Delhi, 2016						
3	Gilbert M.Masters, Introduction to Environmental Engineering and Science", 2nd Edition, Pearson Education 2004.						
4	Allen, D. T. and Shonnard, D. R., Sustainability Engineering: Concepts, Design and Case Studies, Prentice Hall.						
5	Bradley, A.S; Adebayo, A.O., Maria, P. Engineering applications in sustainable design and development, Cengage learning.						
6	Environment Impact Assessment Guidelines, Notification of Government of India, 2006						
7	Mackenthun, K.M., Basic Concepts in Environmental Management, Lewis Publication, London, 1998						
Reference Books							
1	R.K. Trivedi, "Handbook of Environmental Laws, Rules, Guidelines, Compliances and Standard", Vol. I and II, Enviro Media, Edition 2010						
2	Cunningham, W.P. Cooper, T.H. Gorhani, „Environmental Encyclopedia“,Jaico Publ.,House, Mumbai, 2001.						
3	Dharmendra S. Sengar, „Environmental law“, Prentice Hall of India PVT LTD, New Delhi, 2007.						
4	Rajagopalan, R, „Environmental Studies-From Crisis to Cure“, Oxford University Press, Third Edition 2015.						
5	Erach Bharucha "Textbook of Environmental Studies for Undergraduate Courses" Orient Blackswan Pvt. Ltd. 2013.						
Website / URL References							
1	Acid Rain : https://www.youtube.com/watch?v=dmgLESI4GGU						
2	Biogas Plant : https://www.youtube.com/watch?v=3UafRz3QeO8						
3	Rain Water Harvesting : https://www.youtube.com/watch?v=hGtp-U5XhCQ						
4	Nuclear Accident and Nuclear Holocaust : https://www.youtube.com/watch?v=u5eDgYhyDaA						

Blooms Level														
Level 1 (L1) : Remembering					Lower Order Thinking	Fixed Hour Exams	Level 4 (L4) : Analysing					Higher Order Thinking	Projects / Mini Projects	
Level 2 (L2) : Understanding							Level 5 (L5) : Evaluating							
Level 3 (L3) : Applying							Level 6 (L6) : Creating							
Mapping syllabus with Bloom's Taxonomy LOT and HOT														
Unit No	Unit Name					L1	L2	L3	L4	L5	L6	LOT	HOT	Total
Unit 1	ENVIRONMENT AND BIODIVERSITY					7	0	0	0	0	0	7	0	7
Unit 2	ENVIRONMENTAL POLLUTION					2	3	0	1	0	0	5	1	6
Unit 3	RENEWABLE SOURCES OF ENERGY					2	4	0	0	0	0	6	0	6
Unit 4	SUTAINABILITY AND MANAGEMENT					0	7	0	1	0	0	7	1	8
Unit 5	SUTAINABILITY PRACTICES					0	6	0	0	0	0	6	0	6
Total					11	20	0	2	0	0	0	31	2	33
Total Percentage					33.33	60.61	0.00	6.06	0.00	0.00	0.00	93.94	6.06	100.00
CO PO Mapping														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	-	1	1	-	-	3	3	-	-	-	-	-	-	-
CO2	-	2	2	-	-	3	3	-	-	-	-	-	-	-
CO3	-	1	1	-	-	2	2	-	-	-	-	-	-	-
CO4	-	2	1	-	-	2	2	-	-	-	-	-	-	-
CO5	-	2	1	-	-	2	2	-	-	-	-	-	-	-
Avg	-	1.6	1.2	-	-	2.4	2.4	-	-	-	-	-	-	-
Justification for CO-PO mapping														
CO1	Analyze complex engineering problems and reaching conclusions using principles of natural sciences, and engineering sciences (PO2),Design solutions for complex engineering problems with appropriate consideration for the public health and safety, and environmental considerations(PO3), Apply novel techniques for safety and economical issues, and to assume social responsibilities relevant to the professional engineering practice (PO6), Understand the impact of the professional engineering solutions in societal and environmental contexts for sustainable development (PO7)													
CO2	Analyze complex engineering problems and reaching conclusions using principles of natural sciences, and engineering sciences (PO2),Design solutions for complex engineering problems with appropriate consideration for the public health and safety, and environmental considerations(PO3), Apply novel techniques for safety and economical issues, and to assume social responsibilities relevant to the professional engineering practice (PO6), Understand the impact of the professional engineering solutions in societal and environmental contexts for sustainable development (PO7)													
CO3	Analyze complex engineering problems and reaching conclusions using principles of natural sciences, and engineering sciences (PO2),Design solutions for complex engineering problems with appropriate consideration for the public health and safety, and environmental considerations(PO3), Apply novel techniques for safety and economical issues, and to assume social responsibilities relevant to the professional engineering practice (PO6), Understand the impact of the professional engineering solutions in societal and environmental contexts for sustainable development (PO7)													
CO4	Analyze complex engineering problems and reaching conclusions using principles of natural sciences, and engineering sciences (PO2),Design solutions for complex engineering problems with appropriate consideration for the public health and safety, and environmental considerations(PO3), Apply novel techniques for safety and economical issues, and to assume social responsibilities relevant to the professional engineering practice (PO6), Understand the impact of the professional engineering solutions in societal and environmental contexts for sustainable development (PO7)													
CO5	Analyze complex engineering problems and reaching conclusions using principles of natural sciences, and engineering sciences (PO2),Design solutions for complex engineering problems with appropriate consideration for the public health and safety, and environmental considerations(PO3), Apply novel techniques for safety and economical issues, and to assume social responsibilities relevant to the professional engineering practice (PO6), Understand the impact of the professional engineering solutions in societal and environmental contexts for sustainable development (PO7)													
3	High level				2	Moderate level				1	Low level			
Name & Sign of Faculty Incharge : Dr R.Someswaran														
Name & Sign of Subject Expert : Dr.A.Balakrishnan														
Head of the Department :														