



INSTITUTE OF AERONAUTICAL ENGINEERING (Autonomous)

Dundigal, Hyderabad - 500 043

ELECTRICAL AND ELECTRONICS ENGINEERING

COURSE DESCRIPTION FORM

Course Title	Environmental Studies			
Course Code	A60009			
Regulation	R15			
Course Structure	Lectures	Tutorials	Practicals	Credits
	4	-	-	4
Course Coordinator	Mr. VSK Prasadarao, Associate Professor			
Team of Instructors	Mr.VSK Prasadarao, Associate Professor			

I. COURSE OVERVIEW:

Environmental study is interconnected; interrelated and interdependent subject. Hence, it is multidisciplinary in nature. The present course is framed by expert committee of UGC under the direction of Honorable Supreme Court to be as a core module syllabus for all branches of higher education and to be implemented in all universities over India. The course is designed to create environmental awareness and consciousness among the present generation to become environmental responsible citizens. The course description is: multidisciplinary nature of environmental studies, Natural Resources: Renewable and non-renewable resources; Ecosystems; Biodiversity and its conservation; Environmental Pollution; Social Issues and the Environment; Human Population and the Environment; pollution control acts and Field Work. The course is divided into five chapters for convenience of academic teaching followed by field visits.

II. PREREQUISITES:

Level	Credits	Periods	Prerequisite
UG	4	4	Knowledge of basic sciences

III. COURSE ASSESSMENT METHODS:

a) Marks distribution:

Session Marks	University End Exam Marks	Total Marks
There shall be two midterm examinations. Each midterm examination consists of essay paper, objective paper and assignment. The essay paper is for 10 marks of 60 minutes duration and shall contain 4 questions. The student has to answer 2 questions, each carrying 5 marks. The objective paper is for 10 marks of 20 minutes duration. It consists of 10 multiple choice and 10 fill-in-the blank questions, the student has to answer all the questions and each carries half mark.	75	100

<p>First midterm examination shall be conducted for the first two and half units of syllabus and second midterm examination shall be conducted for the remaining portion.</p> <p>Five marks are earmarked for assignments. There shall be two assignments in every theory course. Assignments are usually issued at the time of commencement of the semester.</p> <p>These are of problem solving in nature with critical thinking. Marks shall be awarded considering the average of two midterm tests in each course.</p>		
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IV. EVALUATION SCHEME:

S. No	Component	Duration	Marks
1	I Mid Examination	80 minutes	20
2	I Assignment	--	05
3	II Mid Examination	80 minutes	20
4	II Assignment	--	05
5	External Examination	3 hours	75

V. COURSE OBJECTIVES:

The course should enable the students to:

- I Determine the Natural resources on which the structure of development is raised for sustainability the society through equitable maintenance of natural resources.
- II Illustrate about biodiversity that raises an appreciation and deeper understanding of species, ecosystems and also the interconnectedness of the living world and thereby avoids the mismanagement, misuse and destruction of biodiversity
- III Summarize a methodology for identification, assessment and quantification of global environmental issues in order to create awareness about the international conventions for mitigating global environmental problems
- IV Sustainable development that aims to meet raising human needs of the present and future generations through preserving the environment.
- V Outline green environmental issue provides an opportunity to overcome the current global environmental issues by implementing modern techniques like CDM, green building, green computing etc.

VI. COURSE OUTCOMES:

Students, who complete the course, will have demonstrated the ability to do the following:

- 1 Discover Knowledge regarding environment and its components.
- 2 Understand various ecosystems, their biodiversity and Scientific methods to protect them.
- 3 Categorize different types of pollutions and their control measures.
- 4 Discover effective methods of waste management.
- 5 Analyze global environmental problems and come out with best possible solutions.
- 6 Illustrate green environmental issues.
- 7 Understand environmental laws and Environmental Impact assessments.

VII. HOW PROGRAM OUTCOMES ARE ASSESSED:

Program Outcomes		Level	Proficiency assessed by
PO1	Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.	H	Exercise and Discussion
PO2	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.	S	Exercise and Discussion
PO3	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.	S	Discussion and seminars
PO4	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.	S	Open ended problems
PO5	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.	N	-----
PO6	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.	N	-----
PO7	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.	N	-----
PO8	Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.	N	---
PO9	Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.	N	---
PO10	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.	N	-----
PO11	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.	N	-----
PO12	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.	N	-----

N= None

S= Supportive

H = Highly Related

VIII. HOW PROGRAM SPECIFIC OUTCOMES ARE ASSESSED:

Program Specific Outcomes		Level	Proficiency assessed by
PSO1	Professional Skills: Able to utilize the knowledge of high voltage engineering in collaboration with power systems in innovative, dynamic and challenging environment, for the research based team work.	N	-----
PSO2	Problem-Solving Skills: Can explore the scientific theories, ideas, methodologies and the new cutting edge technologies in renewable energy engineering, and use this erudition in their professional development and gain sufficient competence to solve the current and future energy problems universally.	N	-----
PSO3	Successful Career and Entrepreneurship: The understanding of technologies like PLC, PMC, process controllers, transducers and HMI one can analyze, design electrical and electronics principles to install, test, maintain power system and applications.	S	Discussion and seminars

N - None S - Supportive H - Highly Related

V. SYLLABUS:

UNIT I:

Ecosystems: Definition, Scope and Importance of ecosystem. Classification structure and function of an ecosystem, food chains, food webs and ecological pyramids. Flow of energy, biogeochemical cycles, Bioaccumulation, Biomagnifications, ecosystem value, services and carrying capacity, Field visit.

UNIT II:

Natural Resources: Classification of Resources: Living and Non-Living resources, water resources: use and over utilization of surface and ground water, floods and droughts, Dams: benefits and problems. Mineral resources: use and exploitation, environmental effects of extracting and using mineral resources, Land resources: Forest resources, Energy resources: growing energy needs, renewable and non renewable energy sources, use of alternate energy source, case studies.

UNIT III:

Biodiversity and Biotic Resources: Introduction, Definition, genetic, species and ecosystem diversity. Value of biodiversity; consumptive use, productive use, social, ethical, aesthetic and optional values. India as a mega diversity nation, Hot spots of biodiversity. Field visit. Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts; conservation of biodiversity: In-Situ and Ex-situ conservation. National Biodiversity act.

UNIT IV:

Environmental Pollution and Control Technologies: Environmental Pollution: Classification of pollution, Air Pollution: Primary and secondary pollutants, Automobile and Industrial pollution, Ambient air quality standards. Water pollution: Sources and types of pollution, drinking water quality standards. Soil Pollution: Sources and types, Impacts of modern agriculture, degradation of soil. Noise Pollution: Sources and Health hazards, standards, Solid waste: Municipal Solid Waste management, composition and characteristics of e-Waste and its management. Pollution control technologies: Wastewater Treatment methods: Primary, secondary and Tertiary. Overview of air pollution control technologies, Concepts of bioremediation. Global Environmental Problems and Global Efforts: Climate change and impacts on human environment. Ozone depletion and Ozone depleting substances (ODS). Deforestation and desertification. International conventions / Protocols: Earth summit, Kyoto protocol and Montréal Protocol.

UNIT-V:

Environmental Policy, Legislation & EIA: Environmental Protection act, Legal aspects Air Act- 1981, Water Act, Forest Act, Wild life Act, Municipal solid waste management and handling rules, biomedical waste management and handling rules, hazardous waste management and handling rules. EIA: EIA structure, methods of baseline data acquisition. Overview on Impacts of air, water, biological and Socio-economical aspects. Strategies for risk assessment, concepts of environmental management Plan (EMP). Towards Sustainable Future: Concept of Sustainable Development, Population and its explosion, Crazy Consumerism, Environmental Education, Urban Sprawl, Human health, Environmental Ethics, Concept of Green Building, Ecological Foot Print, Life Cycle assessment (LCA), Low carbon life style.

TEXT BOOKS:

- 1 Benny Joseph. , “Environmental Studies”, New Delhi, Tata McGraw Hill Publishing co. Ltd 1st Edition, 2005.
- 2 Erach Bharucha, “Textbook of Environmental Studies for Undergraduate Courses”, Hyderabad, Universities Press, 1st Edition, 2005.

REFERENCES:

- 1 Anji Reddy. M, “Textbook of Environmental Sciences and Technology”, Hyderabad, BS Publications, 1st Edition, 2007.
- 2 Y Anjaneyulu, “Introduction to Environmental Sciences”, BS Publications, 1st Edition, 2004.
- 3 Anubha Kaushik, “Perspectives in Environmental Science”, New Delhi, New age international, 3rd Edition 2006.

IX. COURSE PLAN:

The course plan is meant as a guideline. There may probably be changes.

Lecture No.	Learning Objectives	Topics to be covered	Reference
1	Summarize about environment and its importance	Definition .Scope, importance and need for Public Awareness.	T2:1-12
2	Summarize about environment and importance of ecosystems	Definition scope and importance of ecosystem	T1: 17-20
3	Provides information regarding ecosystem and applicability	Structure and function of ecosystem	T1: 17-26
4	To understand how all the animals are competing with their food requirements and also understands the various trophic levels in the food chain.	Food chain Food web and pyramids	T1: 28-39
5	Explain the flow of energy through the various components of ecosystem	Flow of energy	TI: 48-57
6	To understand the importance of nutrients and flow of nutrients in ecosystem	Biogeochemical cycles.	T1:57-64
7	Explains the concept of gaseous cycles and their importance in the ecosystem	Gaseous cycles	T1:64-68
8	Explains the concept of sedimentary cycles and their importance in the ecosystem	Sedimentary cycles	T2 :48-49
9	To recognize the toxicity of heavy metals on the biotic and a biotic components. Explains the different services provided by the ecosystems	Bioaccumulation and Biomagnifications and Values of ecosystem	T2:51-55
10	Distinguish about different types of natural resources and their applicability and Illustrate the utility of renewable resource efficiency	Living and non living resources	T1: 76-78
11	Distinguish about different types of natural resources and their applicability	Water resources: use and over utilization of surface and ground water	T1:85-88

12	Describe the impact of over utilization of underground and surface water and Illustrate the utility of renewable resources efficiency.	Floods and Drought	T1:88-90 T2:71-76
13	Discuss the disaster management plans	Dams: benefit and problems.	T1:94-100
14	Describe the benefits and property dams	Mineral resources: use and exploitation	T2: 86-88
15	illustrate the uses of mineral resources	Energy resources: introduction and importance	T2:101-106 T2:108-124
		Solar energy and its application	
16	Enumerate the application of the solar energy in modern ways	Solar collectors	T2:124-138
17	Describe the solar collectors	Wind energy and its application.	T2:139-150
18	Enumerate the application of the wind energy in modern ways	Merits and demerits of wind energy	T2:151-156
19	Discuss the merits and limitation of wind energy	Biomass and its application	T2:158-161
20	Illustrate the definition and importance of biodiversity	Biodiversity and Biotic resources: introduction and definition	T2:162-166
21	Explain the genetic diversity, species and ecosystem diversity	Classification of biodiversity and National biodiversity act.	T2:176-182
22	Describe the ecological values and consumptive values of ecosystem	Values of biodiversity	T1:254-256
23	Provides information regarding indirect value of biodiversity	Indirect values of biodiversity.	T1:257-262 T1:288-289
24	Discuss the hot spot center in and around the country	Hot spots of biodiversity.	T2:187-192
25	Provides information regarding different causes for loss of biodiversity	Threats to biodiversity	T2:192-205
26	Analyze various reasons for conflict of species	Man wild life conflict	R1:179-189
27	Illustrate different methods to protect biodiversity Prevent pollution	Conservation of biodiversity	R1:204-216 R3-213-214
28	Explain the meaning of environmental pollution and classification.	Environmental pollution introduction and classification	T1:257
29	Describe the natural and manmade pollutant that causes air pollution	Air pollution: primary pollutants sources and effects	T1
30	Discuss the secondary pollutant source and effects.	Secondary pollutants source and effects	T2:383
31	Illustrate the automobile pollution.	Automobile and industrial pollution	T2
32	To understand the permissible levels of pollutant	Air quality standards	R1
33	Explain the sources and effects of water pollution	Water pollution sources of water pollution	T2
35	Enumerate the different types of water pollutants.	Types of water pollution.	T1

36	Distinguish the sources and types of water pollution	Soil pollution: sources and types of soil pollution	T2
37	To understand modern agriculture practices	Impact of modern agriculture on soil	T1
38	To activities to degrade the soil	Degradation of soil,	T1
39	To identify the sources and health hazard	Noise pollution: sources and health hazards	T2
40	To have introduction noise quality permissible levels	Noise quality standards	T1
41	Explain the various methods commonly employed for the disposal of solid waste.	Solid waste: Municipal solid waste management	T2
42	To understand the recent trends in e- waste management practices.	E-waste: characteristics and its management	T1
43	Suggest various remedial and control measures to minimize water pollution	Pollution control technologies wastewater treatment methods	T2
44	To understand the recent trends in bio remediation	Concept of bioremediation	T1
45	To understand concept of climate change and impacts.	Global environmental problems: climate change and impact on human	T1
46	Describe the remedial measures of ozone depletion.	Ozone depletion and consequences	T2
47	To evolve strategies to environmental issues.	Measurement of unknown capacitance. Desauty's bridge Wein's bridge Schering bridge	T1
48	Describe the role of government and legal aspects in environmental protection	Environmental policy, legislation and EIA	T2
49	Discuss the salient features of the air and water pollution act.	Air pollution and prevention act, Water pollution and prevention act	T1
50	Summarize different acts in protecting environment and	Municipal solid waste management and Handling rules, Biomedical waste management and handling rules	T2
51	Discuss the salient features of the hazardous waste management	Hazardous waste management and handling rules.	T2
52	To understand the importance of eia for developmental activities	Eia structure	T1
53	Discuss the various data collection methods	Methods of baseline data acquisition	T1
54-56	Discuss various impacts of industries on the environment	Impacts of developmental activities on environmental components	T2
57-58	Discuss the different management plans for protection of environment	Environmental management plans	T1
59	States the aim and objectives of sustainable development.	Towards sustainable features: concepts of sustainable development	T2
60-62	States the aim and objectives and sustainable development.	Crazy consumerisms and urban sprawl	T1
63-65	Explain the environmental ethics and objectives of green buildings	Environmental ethics and concepts of green buildings	T2

X. MAPPING COURSE OBJECTIVES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

Course Objectives	Program Outcomes												Program Specific Outcomes		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
I	S	-	-	S	-	-	-	-	-	-	-	-	S	S	S
II	-	S	-	-	-	-	-	-	-	S	-	-	-	S	-
III	-	-	-	-	-	-	-	S	-	-	S	-	-	S	-
IV	-	-	S	-	S	-	-	-	-	-	-	-	-	S	-
V	-			S											

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XI. MAPPING COURSE LEARNING OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

Course Outcomes	Program Outcomes												Program Specific Outcomes		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
1	S	S	-	S	-	-	-	H	-	-	S	-	S	-	-
2	-	-	-	-	S	-	-	-	-	-	S	-	S	S	-
3	-	S	-	-	S	-	-	S	-	-	-	H	-	S	-
4	-	-	-	S	-	-	-	S	-	S	S	-	-	S	-
5	-	S	-	-	S	-	-	-	-	-	-	-	-	S	-
6	S	-	S	-	-	-	-	-	-	S	-	-	S	-	-
7	-	S	-	-	-	-	-	S	-	-	-	-	S	-	-

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H = Highly Related

Prepared by:
Mr. VSK Prasadarao, Assistant Professor

HOD, EEE