INSTITUTE OF AERONAUTICAL ENGINEERING
(Autonomous)
Dundigal, Hyderabad - 500 043

FRESHMAN ENGINEERING

COURSE DESCRIPTION FORM

Course Title	**ENVIRONMENTAL STUDIES**			
Course Code	**A30009**			
Regulation	R13 – JNTUH			
Course Structure	Lectures	Tutorials	Practical's	Credits
	4		-	4
Course Coordinator	Mr. M. Munichandran, Assistant Professor			
Team of Instructors				

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. PREREQUISITE(S):

Level	Credits	Periods/ Week	Prerequisites
UG	4	4	Knowledge of basic sciences

III. MARKS DISTRIBUTION:

Sessional Marks	University End Exam Marks	Total Marks
Midterm Test 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	75	100

Sessional Marks	University End Exam Marks	Total Marks
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. 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. 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. These are of problem solving in nature with critical thinking. Marks shall be awarded considering the average of two midterm tests in each course.		

IV. EVALUATION SCHEME:

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

V. COURSE OBJECTIVES:

At the end of the course, the students will be able to:

I. Determine the Natural resources on which the structure of development is raised for sustainability of 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:

After completing this course the student must demonstrate the knowledge and ability to:

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**: An ability to apply knowledge of basic sciences, mathematical skills, engineering and technology to solve complex electronics and communication engineering problems (**Fundamental Engineering Analysis Skills**).	N	--
PO2	**Problem analysis**: An ability to identify, formulate and analyze engineering problems using knowledge of Basic Mathematics and Engineering Sciences (**Engineering Problem Solving Skills**).	N	--
PO3	**Design/development of solutions**: An ability to provide solution and to design Electronics and Communication Systems as per social needs **(Social Awareness).**	N	--
PO4	**Conduct investigations of complex problems**: An ability to investigate the problems in Electronics and Communication field and develop suitable solutions (**Creative Skills**).	N	--
PO5	**Modern tool usage** An ability to use latest hardware and software tools to solve complex engineering problems (**Software and Hardware Interface**).	N	--
PO6	**The engineer and society**: An ability to apply knowledge of contemporary issues like health, Safety and legal which influences engineering design **(Social Awareness).**	S	Oral discussion
PO7	**Environment and sustainability**: An ability to have awareness on society and environment for sustainable solutions to Electronics and Communication Engineering problems **(Social Awareness).**	H	Oral discussion
PO8	**Ethics**: An ability to demonstrate understanding of professional and ethical responsibilities **(Professional**	H	Oral Discussions

Program Outcomes		Level	Proficiency assessed by
	Integrity).		
PO9	**Individual and team work**: An ability to work efficiently as an individual and in multidisciplinary teams **(Team work).**	N	--
PO10	**Communication**: An ability to communicate effectively and efficiently both in verbal and written form **(Communication Skills).**	S	Presentations
PO11	**Life-long learning**: An ability to develop confidence to pursue higher education and for life-long learning **(Continuing Education Awareness).**	S	Seminars, Discussions
PO12	**Project management and finance**: An ability to design, implement and manage the electronic projects for real world applications with optimum financial resources **(Practical Engineering Analysis Skills**).	N	--

N - None **S - Supportive** **H - Highly Related**

VIII. HOW PROGRAM SPECIFIC OUTCOMES ARE ASSESSED:

Program Specific Outcomes		Level	Proficiency assessed by
PSO:1	**Professional skills:** Able to utilize the knowledge of aeronautical/aerospace engineering in innovative, dynamic and challenging environment for design and development of new products	S	Lectures, Assignments
PSO:2	**Problem solving skills:** imparted through simulation language skills and general purpose CAE packages to solve practical, design and analysis problems of components to complete the challenge of airworthiness for flight vehicles	N	Tutorials
PSO:3	**Practical implementation and testing skills:** Providing different types of in house and training and industry practice to fabricate and test and develop the products with more innovative technologies	N	Seminars and Projects
PSO:4	**Successful career and entrepreneurship:** To prepare the students with broad aerospace knowledge to design and develop systems and subsystems of aerospace and allied systems and become technocrats		

N - None **S - Supportive** **H - Highly Related**

IX. 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 (2005)., *Environmental Studies*, New Delhi, Tata McGraw Hill Publishing co. Ltd

2. Erach Bharucha (2005)., *Textbook of Environmental Studies for Undergraduate Courses*, Hyderabad, Universities Press.

Reference Books:

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

IX. COURSE PLAN:

At the end of the course, the students are able to achieve the following course learning outcomes:

Lecture No.	Course Learning Outcomes	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	**Ecosystem**: Definition**,** scope and importance of ecosystem	T1: 17-20
3	Provides information regarding ecosystem and applicability	Structure and function of ecosystem	T1: 17-26
4-5	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
6	Explain the flow of energy through the various components of ecosystem	Flow of energy	TI: 48-57
7	To understand the importance of nutrients and flow of nutrients in ecosystem	Biogeochemical cycles.	T1:57-64
8	Explains the concept of gaseous cycles and their importance in the ecosystem	Gaseous cycles	T1:64-68
9	Explains the concept of sedimentary cycles and their importance in the ecosystem	Sedimentary cycles	T2 :48-49
10	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
11	Distinguish about different types	**Energy resources**: Living	T1: 76-78

Lecture No.	Course Learning Outcomes	Topics to be covered	Reference
	of natural resources and their applicability and Illustrate the utility of renewable resources efficiency	and non living resources	T2:59
12	Describe the impact of over utilization of underground and surface water	**Water resources**: use and over utilization of surface and ground water	T1:85-88
13	. Discuss the disaster manage mental plans	Floods and Drought	T1:88-90 T2:71-76
14	Describe the benefits and property dams	Dams: befit and problems.	T1:94-100
15	illustrate the uses of mineral resources	. **Mineral resources:** use and exploitation	T2: 86-88
16	Enumerate the application of the solar energy in modern ways	**Energy resources:**introduction and importance	T2:101-106
		Solar energy and its application	T2:108-124
17	Describe the solar collectors	Solar collectors	T2:124-138
18	Enumerate the application of the wind energy in modern ways	Wind energy and its application.	T2:139-150
19	Discuss the merits and limitation of wind energy	Merits and demerits of wind energy	T2:151-156
20	Enumerate the application of the wind energy in modern ways	Biomass and its application	T2:158-161
21	Illustrate the definition and importance of biodiversity	**Biodiversity and Biotic resources**: introduction and definition.	T2:162-166
22	Explain the genetic diversity, species and ecosystem diversity	Classification of biodiversity and National biodiversity act.	T2:176-182
23	Describe the ecological values and consumptive values of ecosystem	Values of biodiversity	T1:254-256
24	Provides information regarding indirect value of biodiversity	Indirect values of biodiversity.	T1:257-262 T1:288-289
25	Discuss the hot spot center in and around the country	Hot spots of biodiversity.	T2:187-192
26	Provides information regarding different causes for loss of biodiversity	Threats to biodiversity	T2:192-205
27	Analyze various reasons for conflict of species	Man wild life conflict	R1:179-189
28	Illustrate different methods to protect biodiversity, Prevent	Conservation of biodiversity	R1:204-216

Lecture No.	Course Learning Outcomes	Topics to be covered	Reference
	pollution		R3-213-214
29	Explain the meaning of environmental pollution and classification.	**Environmental pollution:** introductionand classification.	T1:257
30	Describe the natural and manmade pollutant that causes air pollution	Air pollution: primary pollutants sources and effects	T1
	Discuss the secondary pollutant source and effects.	Secondary pollutants source and effects	T2
32	Illustrate the automobile pollution.	Automobile and industrial pollution	T2
33	To understand the permissible levels of pollutant.	Air quality standards	R1
34	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.	International protocols	T1
48	Describe the role of government	**Environmental policy,**	T2

Lecture No.	Course Learning Outcomes	Topics to be covered	Reference
	and legal aspects in environmental protection	**legislation and EIA**	
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.	T1
52	To understand the importance of eia for developmental activities.	Eia structure	T2
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 manage mental plans for protection of environment.	Environmental manage mental 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 of 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			
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
I	N							H				N	S	S	N	
II		N								S			N	S		
III				N				S			S		N	S		
IV			S		S							N		S		
V	N			S												

S – Supportive N-NONE **H - Highly Related**

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

Course Outcomes	Program Outcomes												Program Specific Outcomes			
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
1	N		N					H			S	N	S	N	N	
2	N				S						S		S	S		
3		S			S			S				H	N	S		
4	N			S				S		S	S			S		
5	N	S			S								N	S		
6	S		S	N						S			S	N		
7																

S – Supportive N-NONE **H - Highly Related**

Prepared by : Mr.Munichandran

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