



INSTITUTE OF AERONAUTICAL ENGINEERING (Autonomous)

Dundigal, Hyderabad - 500 043

CIVIL ENGINEERING

COURSE DESCRIPTION FORM

Course Title	ENVIRONMENTAL STUDIES			
Course Code	A40009			
Regulation	R13 – JNTUH			
Course Structure	Lectures	Tutorials	Practicals	Credits
	4	-	-	4
Course Coordinator	Dr. Kavita Singh, Associate Professor,			
Team of Instructors	Dr. Kavita Singh, Associate Professor			

I. COURSE OVERVIEW:

As per the Supreme Court direction the Union of India has been included Environmental Education in the curriculum right from the school stage to college/University level since 1988. The University Grants Commission decided to address the issue of Environmental Studies by introducing a basic course on Environment at the undergraduate level. The prime objective for the inclusion of the subject irrespective to all the branches in engineering courses is to make everyone environment literate. The degradation of the environment is linked with the development process. The development should be in a sustainable way which not only meets the present needs but also should compromise the ability of future generations to meet their own needs. Environmental Science is an interdisciplinary academic field that integrates Physical and biological sciences (including physics, chemistry, biology, soil science, geology and geography) to the study of the environment and the solutions of environmental problems. The course description is: multidisciplinary in nature. The course content is divided in to five Units, Ecosystems, Natural Resources, biodiversity and biotic Resources, Environmental Pollution and Control technologies and Environmental Policy, Legislations & EIA for the convenience of academic teaching and learning process

II. PREREQUISITE(S):

Level	Credits	Periods/ Week	Prerequisites
UG	4	4	Knowledge of disaster management and its mitigation

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 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	75	100

Sessional Marks	University End Exam marks	Total marks
<p>the questions and each carries half mark.</p> <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. These are of problem solving in nature with critical thinking.</p> <p>Marks shall be awarded considering the average of two midterm tests in each course.</p>		

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. Understanding the importance of ecosystems, ecological balance for sustainable development.
- II. Recognize the significance of Natural resources, their classification and alternative energy sources for the sustainability of the environment, society and economy by appropriate maintenance of natural resources.
- III. Understand the biodiversity and types of biodiversity along with the Values and conservation of biodiversity.
- IV. Categorize the types of environmental pollution and the various treatment technologies for the diminution of environmental pollutants and contaminants.
- V. Summarize the global environmental issues and to create awareness about the international conventions and protocols for extenuating global environmental problems.
- VI. Understand the sustainable development concept and importance of green building understand the importance of EIA,EIS and EMP.

VI. COURSE OUTCOMES:

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

1. Understand the scarcity of natural resources and will be able to replace them with alternative energy sources for the sustainability of the environment, society and economy.
2. Recognize the types of biodiversity along with the Values and conservation biodiversity and know about the biogeographically regions.
3. Categorize the types of environmental pollution and the various treatment technologies for the diminution of environmental pollutants and contaminants.
4. Summarize the global environmental issues and to create awareness about the international conventions and protocols for extenuating global environmental problems.

5. Understand the importance of Environmental legislation policies.
6. Understand the importance of sustainable development concept of green building

VII. HOW PROGRAM OUTCOMES ARE ASSESSED:

Program Outcomes		Level	Proficiency assessed by
PO1	Fundamental engineering analysis skills: An ability to apply knowledge of computing, mathematical foundations, algorithmic principles, and civil engineering theory in the modelling and design of civil engineering problems.	N	-
PO2	Information retrieval skills: An ability to design and conduct experiments, as well as to analyze and interpret data.	S	Lectures, Assignments, Exams
PO3	Creative skills: An ability to design, implement, and evaluate a system, process, component, or program to meet desired needs, within realistic constraints such as economic, environmental, social, political, health and safety, manufacturability, and sustainability. Graduates have design the competence.	S	Mini Projects
PO4	Teamwork: An ability to function effectively on multi-disciplinary teams.	S	Projects
PO5	Engineering problem solving skills: An ability to analyze a problem, and identify, formulate and use the appropriate computing and engineering requirements for obtaining its solution.	N	-
PO6	Professional integrity: An understanding of professional, ethical, legal, security and social issues and responsibilities. Graduates must understand the principles of ethical decision making and can interpret the ASCE Code of Ethics. Graduates will understand the proper use of the work of others (e.g., plagiarism, copyrights, and patents). Graduates will understand the special duty they owe to protect the public's health, safety and welfare by virtue of their professional status as engineers in society.	S	Lectures, Assignments, Projects
PO7	Speaking / writing skills: An ability to communicate effectively, both in writing and orally. Graduates are able to produce engineering reports using written, oral and graphic methods of communication.	S	Labs, Exams, Assignments
PO8	Engineering impact assessment skills: The broad education necessary to analyze the local and global impact of computing and engineering solutions on individuals, organizations, and society.	S	Discussions
PO9	Social awareness: Knowledge of contemporary issues. Students are aware of emerging technologies and current professional issues.	S	Lectures, Discussions
PO10	Practical engineering analysis skills: An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.	N	-
PO11	Software hardware interface: An ability to apply design and development principles in the construction of software and hardware systems of varying complexity.	N	-
PO12	Successful career and immediate employment: An ability to recognize the importance of professional development by pursuing postgraduate studies or face competitive examinations that offer challenging and rewarding careers in	S	Discussions

	Civil Engineering.		
--	--------------------	--	--

N – None

S – Supportive

H - Highly Related

VIII. HOW PROGRAM SPECIFIC OUTCOMES ARE ASSESSED:

Program Specific Outcomes		Level	Proficiency assessed by
PSO1	UNDERSTANDING: Graduates will have an ability to understand, analyze and solve problems using basic mathematics and apply the techniques related to irrigation, structural design, etc.	N	-
PSO2	ANALYTICAL SKILLS: Graduates will have an ability to design civil structures, using construction components and to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety manufacturability and reliability and learn to work with multidisciplinary teams.	H	Projects
PSO3	BROADNESS: Graduates will have an exposure to various fields of engineering necessary to understand the impact of other disciplines on civil engineering blueprints in a global, economic, and societal context and to have necessary focus for postgraduate education and research opportunities at global level.	S	Guest Lectures

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 visits.

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. Textbook of Environmental studies for undergraduate courses by Erach Bharucha for University Grants Commission.
2. Environmental studies by R. Rajagopalan, Oxford University Press.

REFERENCE BOOKS

1. Environmental Science: towards a sustainable future by Richard T.Wright. 2008 PHL Learning Private Ltd. New Delhi.
2. Environmental Engineering and science by Gilbert M.Masters and Wendell P. Ela .2008 PHI Learning Pvt. Ltd.
3. Environmental Science by Daniel B.Botkin & Edward A.Keller, Wiley INDIA edition.
4. Environmental Studies by Anubha Kaushik, 4th Edition, New age international publishers.
5. Text book of Environmental Science and Technology - Dr. M. Anji Reddy 2007, BS Publications.

X. 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
1-2	Understands the importance of Environmental Studies and its need in present day life style.	Role of Environmental Studies and organizations related to environment in India.	R4: 1.1
3-4	Summarize about environment and importance of ecosystems	Ecosystem: Definition, scope and importance of ecosystem.	R4: 1.2,1.3 pg. 2
5-6	Provides information regarding ecosystem and applicability	Structure and function of ecosystem	R4:1.6,1.7 pg 12
7-8	To understand how all the	Food chain, Food web and	

	animals are competing with their food requirements and also understands the various trophic levels in the food chain.	Ecological pyramids.	R4: 1.7.1,1.7.2 pg 15
9-10	Explain the flow of energy through the various components of ecosystem	Flow of energy	R4: 1.7.5 pg 22
11-12	To understand the importance of biogeochemical cycles	Biogeochemical cycles.	R4; 1.7.6 pg 25
13-14	To recognize the toxicity of heavy metals on the biotic and abiotic components.	Bioaccumulation and Biomagnifications	R4: 1.7.3 pg 19
15-16	To know the biotic potential of the species and explains the different services provided by the ecosystems	Carrying capacity of ecosystem and Values of ecosystem	R4: 1.10 pg 32
17-18	Classification of Resources: Living and Non-Living resources Describe the impact of over utilization of underground and surface water.	Classification of Resources: Living and Non-Living resources Water resources: use and over utilization of surface and ground water	R4: 2.1,2.2 pg 37
19-20	Discuss the disaster manage mental plans	Floods and Drought	R4: 2.2.3, 2.2.5 pg 42-43
21-22	Describe the benefits and property dams	Dams: befit and problems.	R4: 2.3 pg 44
23-24	illustrate the uses of mineral resources	Mineral resources: use and exploitation	R4: 2.4 pg 45
25-26	Describe the effects of mineral extraction of mineral resources	Environmental effect extracting and using of mineral resources.	R4: 2.4.2 pg 49
27-28	Discuss reasons for land depletion	Land resources: land degradation and forest resources.	R4: 2.6 pg 70
29-30	Enumerate the importance of the energy resources	Energy resources: introduction and importance.	R4: 2.5 pg 53
31-32	Enumerate the importance of the energy resources	Energy resources: introduction and importance.	R4: 2.5 pg 53
33-34	To understand the importance of alternate sources of energy	Use of alternate energy source, case studies.	R4: 2.5.2 pg 55

35-36	Summarize about different commercially valuable products provided by biodiversity, Describe the ecological values and consumptive values of ecosystem	Values of biodiversity, Indirect values of biodiversity	R4: 3.2, 3.2.1, 3.2.2, 3.2.3pg 84-85
37-38	Discuss the hot spot center in and around the country, Provides information regarding different causes for loss of biodiversity	Hot spots of biodiversity, Threats to biodiversity	R4: 3.4, 3.5 pg 89-96
39-40	Analyze various reasons for conflict of species, Illustrate different methods to protect biodiversity,	Man wild life conflict, Conservation of biodiversity: on site conservation.	R4: 3.5.3 pg 98

XI. 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
I		S	S	S		S	S	S	S			S		H	S
II		S	S	S		S	S	S	S			S		H	S
III		S	S	S		S	S	S	S			S		H	S
IV		S	S	S		S	S	S	S			S		H	S
V		S	S	S		S	S	S	S			S		H	S

S – Supportive

H - Highly Related

XII. 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
1		S	S	S		S	S	S	S			S		H	S
2		S	S	S		S	S	S	S			S		H	S
3		S	S	S		S	S	S	S			S		H	S
4		S	S	S		S	S	S	S			S		H	S
5		S	S	S		S	S	S	S			S		H	S
6															

7	H	H	H	S	S	S	S	S	H	S	S	S	H	H	S
---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---

S – Supportive

H - Highly Related

Prepared by: Dr. Kavita Singh, Associate Professor.

HOD, CIVIL ENGINEERING