



INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)

Dundigal, Hyderabad -500 043

CIVIL ENGINEERING

COURSE DESCRIPTOR

Course Title	DISASTER MANAGEMENT AND MITIGATION				
Course Code	ACE533				
Programme	B.Tech				
Semester	V	Civil Engineering			
Course Type	Elective				
Regulation	IARE - R16				
Course Structure	Theory			Practical	
	Lectures	Tutorials	Credits	Laboratory	Credits
	3	-	3	-	-
Chief Coordinator	Mr. S. Selva Prakash, Assistant Professor, Civil Engineering				
Course Faculty	Dr. J S R Prasad, Professor, Civil Engineering				

I. COURSE OVERVIEW:

This course is intended to provide fundamental understanding of different aspects of Disaster Management. It will expose the students to the concept and functions of Disaster Management and to build competencies of Disaster Management professionals and development practitioners for effective supporting environment as put by the government in legislative manner. It would also provide basic knowledge, skills pertaining to Planning, Organizing and Decision-making process for Disaster Risk Reduction.

II. COURSE PRE-REQUISITES:

Level	Course Code	Semester	Prerequisites
-	-	-	-

III. MARKSDISTRIBUTION:

Subject	SEE Examination	CIA Examination	Total Marks
Disaster Management and Mitigation	70 Marks	30 Marks	100

IV. DELIVERY / INSTRUCTIONAL METHODOLOGIES:

✗	Chalk & Talk	✓	Quiz	✓	Assignments	✗	MOOCs
✓	LCD / PPT	✓	Seminars	✗	Mini Project	✗	Videos
✗	Open Ended Experiments						

V. EVALUATION METHODOLOGY:

The course will be evaluated for a total of 100 marks, with 30 marks for Continuous Internal Assessment (CIA) and 70 marks for Semester End Examination (SEE). Out of 30 marks allotted for CIA during the semester, marks are awarded by taking average of two CIA examinations or the marks scored in the make-up examination.

Semester End Examination (SEE): The SEE is conducted for 70 marks of 3 hours duration. The syllabus for the theory courses is divided into five units and each unit carries equal weightage in terms of marks distribution. The question paper pattern is as follows. Two full questions with “either” or “choice” will be drawn from each module. Each question carries 14 marks. There could be a maximum of two sub divisions in a question.

The emphasis on the questions is broadly based on the following criteria:

50 %	To test the objectiveness of the concept.
50 %	To test the analytical skill of the concept OR to test the application skill of the concept.

Continuous Internal Assessment (CIA):

CIA is conducted for a total of 30 marks (Table 1), with 20 marks for Continuous Internal Examination (CIE), and 05 marks for Quiz /Alternative Assessment Tool (AAT).

Table 1: Assessment pattern for CIA

Component	Theory		Total Marks
	CIE Exam	Quiz/AAT	
CIA Marks	25	05	30

Continuous Internal Examination (CIE):

The CIE exam is conducted for 25 marks of 2 hours duration consisting of two parts. Part- A shall have five compulsory questions of one mark each. In part-B, four out of five questions have to be answered where, each question carries 5 marks. Marks are awarded by taking average of marks scored in two CIE exams.

Quiz - Online Examination/Alternative Assessment Tool (AAT)

Two Quiz exams shall be online examinations consisting of 20 multiple choice questions and are to be answered by choosing the correct answer from a given set of choices (commonly four). Marks shall be awarded considering the average of two quizzes for every course. The AAT may include seminars, assignments, term paper, open ended experiments, micro projects, five minutes video and MOOCs.

VI. HOW PROGRAM OUTCOMES ARE ASSESSED:

Program Outcomes (POs)		Strength	Proficiency assessed by
PO 1	Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.	3	Presentation on real-time applications
PO 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	2	Seminars
PO 4	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.	1	Presentation on real-time applications

3 = High; 2 = Medium; 1 = Low

VII. HOW PROGRAM SPECIFIC OUTCOMES ARE ASSESSED:

Program Specific Outcomes (PSOs)		Strength	Proficiency assessed by
PSO 1	Engineering Knowledge: Graduates shall demonstrate sound knowledge in analysis, design, laboratory investigations and construction aspects of civil engineering infrastructure, along with good foundation in mathematics, basic sciences and technical communication.	3	Presentation on real-time applications
PSO 2	Broadness and Diversity: Graduates will have a broad understanding of economic, environmental, societal, health and safety factors involved in infrastructural development, and shall demonstrate ability to function within multidisciplinary teams with competence in modern tool usage.	-	-
PSO 3	Self-Learning and Service: Graduates will be motivated for continuous self-learning in engineering practice and/or pursue research in advanced areas of civil engineering in order to offer engineering services to the society, ethically and responsibly.	-	-

3 = High; 2 = Medium; 1 = Low

VIII. COURSE OBJECTIVES :

The course should enable the students to:	
I	Identify the major disaster types and develop an understanding of modern disaster management.
II	Recognize and develop awareness of the chronological phases of natural disaster response and refugee relief operations.
III	Understand the key concepts of disaster management related to development and the relationship of different disaster management activities.
IV	Categorize the organizations that are involved in natural disaster assistance and relief system.

IX. COURSE OUTCOMES (COs):

COs	Course Outcome	CLOs	Course Learning Outcome
CO 1	Understand to describe the basic types of Environmental hazards and disasters. Understand how to react effectively to natural, man-made, and technological threats.	CLO 1	Integrate knowledge and to analyze, evaluate and manage the different public health aspects of disaster events at a local and global levels, even when limited information is available.
		CLO 2	Analyze and evaluate the environmental, social, cultural, economic, legal and organizational Aspects influencing vulnerabilities and capacities to face disasters. and to know about different types of environmental hazards
		CLO 3	Obtain knowledge on different types of natural and man- made disasters. Work theoretically and practically in the processes of disaster management (disaster risk reduction, response, and recovery)
		CLO 4	Describe endogenous and exogenous hazards their harmful effects to the environment. Case studies of India
CO 2	Understand how to react effectively to natural, man-made, and planetary hazards.	CLO 5	Analyze, and communicate information on risks, relief needs and order to formulate strategies for mitigation.
		CLO 6	Understand the Mitigation and control measures of exogenous hazards.
		CLO 7	Understand different approaches of different phases
		CLO 8	Capacity to analyze and evaluate research work on the field of emergencies and disaster.
		CLO 9	Demonstrating insight into the potential and limitations of science, its role in society and people's responsibility for how it is used. And emerging approaches of disasters.
CO 3	Explore the history of the field and comprehend how past events are earthquake, landslides and volcanic hazards.	CLO 10	Analyze the future scenarios with the ability to clearly present and discuss their conclusions and the knowledge and arguments.
		CLO 11	Understand integrated approach for disaster preparedness, mitigation & awareness; Mitigation.
		CLO 12	Understand different types of institution for disaster mitigation and management
		CLO 13	Design and perform research on the different aspects of the emergencies and disaster.
		CLO 14	Relate their interconnections, particularly in the field of the Public Health aspects of the disasters.
		CLO 15	Understand different approaches to prevent disasters.

COs	Course Outcome	CLOs	Course Learning Outcome
CO 4	Describe the basic concepts of the emergency management cycle mitigation, preparedness, response, and recovery	CLO 16	Understanding the race process of dealing with work place hazards.
		CLO 17	Identification of natural calamities that tends to hazards and disasters.
		CLO 18	Understand the integrated approach for disaster preparedness, mitigation & awareness; mitigation
CO 5	Recognizes the stakeholders in disaster management system, their jurisdiction and responsibilities	CLO 19	Analyze the Meteorological observatory, seismological observatory, volcanology institution
		CLO 20	Understand the working of institution of urban & regional planners, engineering council, world meteorological organizations (WMO).
		CLO 21	Understand the world federation of engineering organizations (WFED).

X. COURSE LEARNING OUTCOMES (CLOs):

CLO Code	CLO's	At the end of the course, the student will have the ability to:	PO's Mapped	Strength of Mapping
ACE533.1	CLO 1	Integrate knowledge and to analyze, evaluate and manage the different public health aspects of disaster events at a local and global levels, even when limited information is available.	PO 1	3
ACE533.2	CLO 2	Analyze and evaluate the environmental, social, cultural, economic, legal and organizational Aspects influencing vulnerabilities and capacities to face disasters. and to know about different types of environmental hazards	PO 1	3
ACE533.3	CLO 3	Obtain knowledge on different types of natural and man- made disasters. Work theoretically and practically in the processes of disaster management (disaster risk reduction, response and recovery)	PO 1	3
ACE533.4	CLO 4	Describe endogenous and exogenous hazards their harmful effects to the environment. Case studies of India	PO 2	2
ACE533.5	CLO 5	Analyze, and communicate information on risks, relief needs and order to formulate strategies for mitigation.	PO 2	2
ACE533.6	CLO 6	Understand the Mitigation and control measures of exogenous hazards.	PO 2	2
ACE533.7	CLO 7	Understand different approaches of different phases	PO 2	2
ACE533.8	CLO 8	Capacity to analyze and evaluate research work on the field of emergencies and disaster.	PO 4	2
ACE533.9	CLO 9	Demonstrating insight into the potential and limitations of science, its role in society and people's responsibility for how it is used. And emerging approaches of disasters.	PO 2	2
ACE533.10	CLO 10	Analyze the future scenarios with the ability to clearly present and discuss their conclusions and the knowledge and arguments.	PO 2	2
ACE533.11	CLO 11	Understand integrated approach for disaster preparedness, mitigation & awareness; Mitigation.	PO 1	2
ACE533.12	CLO 12	Understand different types of institution for disaster mitigation and management	PO 1	-
ACE533.13	CLO 13	Design and perform research on the different aspects of the emergencies and disaster.	PO 1	2

CLO Code	CLO's	At the end of the course, the student will have the ability to:	PO's Mapped	Strength of Mapping
ACE533.14	CLO 14	Relate their interconnections, particularly in the field of the Public Health aspects of the disasters.	PO 1	2
ACE533.15	CLO 15	Understand different approaches to prevent disasters.	PO 2	2
ACE533.16	CLO 16	Understanding the race process of dealing with work place hazards.	PO 1; PO 2	2
ACE533.17	CLO 17	Identification of natural calamities that tends to hazards and disasters.	PO 1; PO 2	2
ACE533.18	CLO 18	Understand the integrated approach for disaster preparedness, mitigation & awareness; mitigation	PO 1; PO 2	2
ACE533.19	CLO 19	Analyze the Meteorological observatory, seismological observatory, volcanology institution	PO 1; PO 2	2
ACE533.20	CLO 20	Understand the working of institution of urban & regional planners, engineering council, world meteorological organizations (WMO).	PO 1; PO 2	2
ACE533.21	CLO 21	Understand the world federation of engineering organizations (WFED).	PO 2	2

3= High; 2 = Medium; 1 = Low

XI. MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES

Course Outcomes (COs)	Program Outcomes (POs)			
	PO 1	PO 2	PO 4	PSO1
CO 1	3	2		1
CO 2		2	1	
CO 3	3	2		1
CO 4	3	2		1
CO 5	3	2		

3= High; 2 = Medium; 1 = Low

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

Course Learning Outcomes (CLOs)	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CLO 1	3												1		
CLO 2		2													
CLO 3	3												1		
CLO 4	3												1		
CLO 5		2													

Course Learning Outcomes (CLOs)	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CLO 6		2													
CLO 7		2													
CLO 8		2													
CLO 9				1											
CLO 10				1											
CLO 11		2											1		
CLO 12		2											1		
CLO 13	3														
CLO 14	3														
CLO 15	3														
CLO 16	3	2											1		
CLO 17	3	2											1		
CLO 18	3	2											1		
CLO 19	3	2											1		
CLO 20	3	2											1		
CLO 21	3	2													

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XIII. ASSESSMENT METHODOLOGIES–DIRECT

CIE Exams	PO1, PO 2, PO 4, PSO1	SEE Exams	PO1, PO 2, PO 4, PSO1	Assignments	PO 2	Seminars	PO1, PO2
Laboratory Practices	-	Student Viva	-	Mini Project	-	Certification	-
Term Paper	-						

XIV. ASSESSMENT METHODOLOGIES-INDIRECT

✓	Early Semester Feedback	✓	End Semester OBE Feedback
✗	Assessment of Mini Projects by Experts		

XV. SYLLABUS

UNIT-I	ENVIRONMENTAL HAZARDS AND DISASTERS
Environmental hazards and disasters: meaning of environmental hazards, environmental disasters and environmental stress; concept of environmental hazards, environmental stress and environmental disasters, different approaches and relation with human ecology, landscape approach, ecosystem approach, perception approach, human ecology and its application in geographical researches.	
UNIT-II	TYPES OF ENVIRONMENTAL HAZARDS AND DISASTERS
Types of environmental hazards and disasters: Natural hazards and disasters, man induced hazards and disasters, natural hazards, planetary hazards/ disasters, extra planetary hazards/ disasters, planetary hazards, endogenous hazards, exogenous hazards.	
UNIT-III	ENDOGENOUS HAZARDS AND EXOGENOUS HAZARDS
<p>Endogenous hazards, volcanic eruption, earthquakes, landslides, volcanic hazards/ disasters, causes and distribution of volcanoes, hazardous effects of volcanic eruptions, environmental impacts of volcanic eruptions, earthquake hazards/disasters, causes of earthquakes, distribution of earthquakes, hazardous effects of earthquakes, earthquake hazards in India, human adjustment, perception & mitigation of earthquake.</p> <p>Exogenous hazards/ disasters, infrequent events, cumulative atmospheric hazards/ disasters, infrequent events: Cyclones, lightning, hailstorms; Cyclones: Tropical cyclones & local storms (causes, distribution human adjustment, perception & mitigation), cumulative atmospheric hazards/ disasters: Floods, droughts. cold waves; heat waves floods: Causes of floods, flood hazards India, flood control measures (human adjustment, perception & mitigation), droughts, impacts of droughts, drought hazards in India- drought control measures, extra planetary hazards/ disasters, man induced hazards /disasters, physical hazards/ disasters, soil erosion.</p>	
UNIT-IV	EMERGING APPROACHES IN DISASTER MANAGEMENT
<p>Emerging approaches in Disaster Management. Three Stages</p> <ol style="list-style-type: none"> 1. Pre, disaster stage (preparedness) 2. Emergency Stage 3. Post Disaster stage, Rehabilitation. 	
UNIT-V	DISASTER MANAGEMENT- AN INTEGRATED APPROACH
Disaster Management: An integrated approach for disaster preparedness, mitigation & awareness; mitigation: Institutions, discuss the work of following Institution: Meteorological observatory, seismological observatory, volcanology institution, hydrology laboratory, institution of urban & regional planners, engineering council, world meteorological organizations (WMO), geographical information system (GIS), world federation of engineering organizations (WFED).	
Text Books:	
<ol style="list-style-type: none"> 1. PardeepSahni, "Disaster Mitigation: Experiences and Reflections", PHI Learning Pvt. Ltd., 1st Edition, 2001. 2. J. Glynn, Gary W. Hein Ke, "Environmental Science and Engineering", Prentice Hall Publishers, 2nd Edition, 1996. 	
Reference Books:	
<ol style="list-style-type: none"> 1. R.B.Singh (Ed), "Environmental Geography", 2nd Edition, 1990. 2. R.B. Singh (Ed), "Disaster Management", 2nd Edition, 2006. 	

XVI. COURSE PLAN:

The course plan is meant as a guideline. Probably there may be changes.

Lecture No	Topics to be covered	Course Learning Outcomes (CLOs)	Reference
1	Environmental hazards and disasters	CLO 1	T2:26.3
2-3	Meaning of environmental hazards	CLO 1	R2:21.48
4-5	Environmental disasters and environmental stress	CLO 2	T2:26.6 R2:21.50
6-7	Different approaches and relation with human ecology	CLO 3	T2:26.7 R2:21.51
8-9	landscape approach, ecosystem approach, perception approach,	CLO 4	T2:26.8
10-11	Human ecology and its application in geographical researches	CLO 4	T2:26.10
12-13	Types of environmental hazards and disasters	CLO 5	T2:26.14 R2:21.55
14-15	Natural hazards and disasters, man induced hazards	CLO 8	T2:26.15 R2:21.58
16-18	Natural hazards and planetary hazards	CLO 9	T2:26.16 R2:21.61
19-20	Extra planetary hazard ,disasters & planetary hazards	CLO 10	T2:25.12 R2:21.24
21-22	Endogenous hazards	CLO 11	T2:25.16 R2:21.29
23	Exogenous hazards.	CLO 12	T2:25.14 R2:21.31
24-25	Endogenous hazards, volcanic eruption, earthquakes, landslides, volcanic hazards& disasters	CLO 13	T2:25.14 R2:21.33
26-27	Causes and distribution of volcanoes, hazardous effects of volcanic eruptions.	CLO 14	R2:21.33
28	Environmental impacts of volcanic eruptions, earthquake hazards & disasters.	CLO 13	T2:27.2 R2:21.64
29	Causes of earthquakes, distribution of earthquakes, hazardous effects of earthquakes.	CLO 15	T2:27.2
30	Earthquake in different types of waves, fault & zones in India.	CLO 15	T2:27.2 R2:21.67
31-33	Earthquake hazards in India, human adjustment, perception & mitigation of earthquake.	CLO 16	T2:27.2
34	Exogenous hazards/ disasters, infrequent events	CLO 17	T2:27.3 R2:21.71
35	cumulative atmospheric hazards/ disasters, infrequent events	CLO 17	T2:27.4 R2:21.68
36	Cyclones, lightning, hailstorms; Cyclones	CLO 19	T2:27.7 R2:21.74
37	Tropical cyclones & local storms(causes, distribution human adjustment, perception & mitigation)	CLO 19	T2:27.12 R2:21.75
38	Cumulative atmospheric hazards/ disasters: Floods, droughts. Cold waves heat waves floods Causes of floods, flood hazards India, flood control measures	CLO 20	T2:27.8 R2:21.72
39	Droughts, impacts of droughts, drought hazards in India-drought control measures, extra planetary hazards/ disasters, man induced hazards	CLO 20	T2:27.8 R2:21.73
40	Emerging approaches in Disaster Management Pre, disaster stage (preparedness) Emergency Stage Post Disaster stage.	CLO 21	T2:27.14 R2:21.78
41	An integrated approach for disaster preparedness, mitigation & awareness mitigation .Institutions, discuss the work of following Institution	CLO 21	T2:27.19 R2:21.814

Lecture No	Topics to be covered	Course Learning Outcomes (CLOs)	Reference
42	Meteorological observatory, seismological observatory, volcanology institution, hydrology laboratory	CLO 21	T2:27.12 R2:21.82
43	Engineering council, world meteorological organizations (WMO), geographical information system (GIS), and world federation of engineering organizations (WFED).	CLO 21	T2:27.18 R2:21.82

XVII. GAPS IN THE SYLLABUS-TO MEET INDUSTRY / PROFESSION REQUIREMENTS:

S No	Description	Proposed actions	Relevance With POs	Relevance With PSOs
1	To improve standards and analyze the concepts.	Seminars	PO 1	PSO 1
2	To encourage students in solving applications and prepare towards competitive examinations.	NPTEL	PO 2	PSO 1

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