

Institute/ School Name	School of Engineering and Technology		
Department Name	Department of Computer Science & Engineering		
Program Name	Bachelor of Engineering (Computer Science & Engineering): B.E (CSE)		
Course Code	24UH003	Course Name	Disaster Management
L-T-P (Per Week)	2-0-0	Course Credits	Non-Credit
Academic Year	2025-26	Semester/Batch	4 <sup>th</sup> /2024-2028
Pre-requisites (if any)	None		
NHEQF Level	5	SDGs	4, 11, 13
Course Coordinator	Dr. Ashok Kumar		

## 1. Scope and Objective of the Course:

This interdisciplinary course introduces students to disaster risk reduction (DRR) and management using data-driven, technological, and computational perspectives. It integrates global DRR frameworks with digital technologies such as GIS, data analytics, AI, remote sensing, and decision-support systems. The course aims to develop analytical, design, and evaluation skills in socially responsible engineers, enabling them to design, assess, and implement resilient, technology-enabled solutions for disaster preparedness, mitigation, response, and recovery, aligned with sustainable development goals and national resilience priorities.

## 2. Programme Outcomes (POs):

At the end of the programme, students will be able to achieve knowledge about the following:	
PO 1	<b>Engineering knowledge:</b> Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO 2	<b>Problem analysis:</b> Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO 3	<b>Design/development of solutions:</b> 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.
PO 4	<b>Conduct investigations of complex problems:</b> 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.
PO 5	<b>Modern tool usage:</b> Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.
PO 6	<b>The engineer and society:</b> 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.
PO 7	<b>Environment and sustainability:</b> Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO 8	<b>Ethics:</b> Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO 9	<b>Individual and teamwork:</b> Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO10	<b>Communication:</b> 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.
PO11	<b>Project management and finance:</b> 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.
PO12	<b>Life-long learning:</b> 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.

### 3. Course Learning Outcomes (CLO):

After completing the course, the students will be able to:

- CLO1:** Acquire knowledge of global disaster risk reduction frameworks and policies and explain their significance in disaster management.
- CLO2:** Analyse disaster risk using data, computational models and digital tools.
- CLO3:** Acquire the skill of designing and evaluating technology-enabled solutions for disaster preparedness and response.
- CLO4:** Apply ethical, people-centred and sustainable approaches in disaster management systems.

### 4. CLO-PO Mapping Matrix:

Course Learning Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	NHEQF Level Descriptor
CLO1	M							M		M			Q1
CLO2		H					M			L		M	Q2
CLO3	H			M		M			M		M		Q2
CLO4			M			H				M			Q3

### 5. ERISE Grid Mapping:

Feature Enablement	Level (1-5, 5 being highest)
Entrepreneurship	2
Research/Innovation	3
Skills	5
Employability	2

### 6. Recommended Books (Reference Books/Text Books):

- B01:** Haddow, G. D., Bullock, J. A., & Coppola, D. P. (2021). Introduction to emergency management (7th ed.). Butterworth-Heinemann.
- B02:** Kelman, I. (Ed.). (2017). Disaster risk reduction: Cases from urban Africa. Routledge.
- B03:** Coppola, D. P. (2015). Introduction to international disaster management (3rd ed.). Butterworth-Heinemann.
- B04:** United Nations Office for Disaster Risk Reduction (UNDRR). (2019). Global assessment report on disaster risk reduction. United Nations.

### 7. Other readings and relevant websites:

Resources	Link of Journals, Magazines, Websites and Research Papers
R1	<a href="https://www.journals.elsevier.com/international-journal-of-disaster-risk-reduction">https://www.journals.elsevier.com/international-journal-of-disaster-risk-reduction</a>
R2	<a href="https://nidm.gov.in/journal/">https://nidm.gov.in/journal/</a>
R3	<a href="https://www.undrr.org">https://www.undrr.org</a>
Resources	Link of Audio-Video resources
V1	<a href="https://elearning.nidm.gov.in/local/home/index.php">https://elearning.nidm.gov.in/local/home/index.php</a>
V2	<a href="https://onlinecourses.swayam2.ac.in/cec25_hs135/preview">https://onlinecourses.swayam2.ac.in/cec25_hs135/preview</a>

### 8. Recommended Platform:

- Kaya Learning Platform

**9. Course Plan:**

Chapter Number	Topics	Weightage in ETE (%)	Instructional Resources
1	Introduction to Disasters and Risk Concepts: Definitions: Disaster, hazard, risk, vulnerability, resilience; Disaster vs emergency vs crisis; Types of disasters: natural, human-induced, complex emergencies; The disaster management cycle; Social, economic and environmental impacts of disasters; Paradigm shifts in DRR (from response to risk reduction).	12	B01,B02,B03 ,B04,R1,R2,R3,V1,V2
2	Global Frameworks, Policies and Governance: Sendai Framework for Disaster Risk Reduction (SFDRR); SDGs and disaster risk interplay; Hyogo Framework and evolution to Sendai; National and sub-national DRR policies; Institutional arrangements and coordination mechanisms; Roles of UNDRR and international bodies.	12	B01,B02,B03 ,B04,R1,R2,R3,V1,V2
3	Disaster Risk, Hazard Identification & Vulnerability: Risk assessment concepts: hazard × exposure × vulnerability; Types of hazards and risk profiling; Vulnerability vs capacity; Tools for hazard identification (e.g., GIS, remote sensing); Community vulnerability assessment methods; multi-hazard risk mapping.	12	B01,B02,B03 ,B04,R1,R2,R3,V1,V2
4	Disaster Preparedness and Early Warning Systems: Preparedness planning steps; Early warning system components; Communication networks and protocols; Public education and awareness campaigns; Drills and simulation exercises; Resource planning and logistics.	12	B01,B02,B03 ,B04,R1,R2,R3,V1,V2
5	Disaster Mitigation and Risk Reduction Strategies: Structural mitigation measures (infrastructure, land planning); Non-structural mitigation (policies, education, enforcement); Community-based DRR; Climate adaptation as mitigation; Integrating resilience into development plans; Case studies on effective mitigation.	12	B01,B02,B03 ,B04,R1,R2,R3,V1,V2
6	Disaster Response and Emergency Operations: Principles of effective disaster response; Incident Command System and coordination; Search, rescue and medical response; Relief supply chain management; Safety and security in emergency operations; Stakeholder roles: government, NGOs, private sector.	12	B01,B02,B03 ,B04,R1,R2,R3,V1,V2
7	Post-disaster Recovery, Reconstruction & 'Build Back Better': Recovery planning and strategies; Rehabilitation of livelihoods and services; 'Build back better' concept; Psychosocial support systems; Monitoring and evaluation of recovery programs; Community participation in recovery.	12	B01,B02,B03 ,B04,R1,R2,R3,V1,V2
8	Innovation, Technology and Future Directions in DRR: Data analytics and predictive modelling; Machine Learning/AI for risk assessment; Mobile tech in early warning and communications; GIS and Earth observation tools; Technology case studies and applications; Emerging global risk trends (urbanisation, climate change).	12	B01,B02,B03 ,B04,R1,R2,R3,V1,V2

**10. Innovative Pedagogies:**

- Case study-based learning (Annexure-I)

**11. Action plan for different types of learners**

Slow Learners	Average Learners	Advanced Learners
Remedial Classes	Guest Lectures (Annexure-II)	Trainings (Annexure-III)

**12. Evaluation Scheme & Components:**



Evaluation Component	Type of Component	No. of Assessments	Weightage of Component	Mode of Assessment (Offline/ Online)
External Component	Certification	01	100%	Online
<b>Total</b>			<b>100%</b>	

**13. Format of Evaluation Components:**

Type of Assessment	Total Marks	Industry Certification	Hands-on Assessments	1 Mark MCQ	2 Marks	5 Marks	10 Marks
End Term Examination*	-	1	-	-	-	-	-

\* Minimum 75% attendance is required to become eligible for appearing in the End Semester Examination.

**14. This Document is.**

Designation	Name	Signature
Prepared by Course Coordinator	Dr. Ashok Kumar	
Verified by Assistant Dean	Dr. Hakam Singh	
Date	12/01/2026	

### Annexure-I

S. No	Topics
1	Case study-based learning
<b>Description:</b> Case study-based learning exposes students to real-world disaster scenarios such as floods, earthquakes, pandemics and industrial accidents. Learners analyse disaster data, assess risks, evaluate response strategies and propose technology-driven solutions using computational tools, fostering critical thinking and application-oriented learning.	
<b>Key Objectives:</b> <ul style="list-style-type: none"> <li>To develop analytical and problem-solving skills through real disaster scenarios.</li> <li>To apply DRR frameworks and digital tools in practical decision-making contexts.</li> </ul>	
<b>Group Formation Requirements:</b> <ul style="list-style-type: none"> <li>Groups of 4–5 students with mixed analytical and programming skill levels.</li> <li>Each group must assign defined roles (data analyst, designer, documentation lead, presenter).</li> </ul>	

### Annexure-II

S. No	Topics
1	Guest Lectures
<b>Description:</b> Guest lectures by professionals from disaster management authorities, NGOs, UN agencies and industry provide students with insights into real-time disaster response, policy implementation and technology applications. These sessions bridge theory and practice, enhancing contextual understanding and professional awareness.	
<b>Key Objectives:</b> <ul style="list-style-type: none"> <li>To expose students to industry practices and real-world challenges in disaster management.</li> <li>To understand interdisciplinary and ethical dimensions of DRR implementation.</li> </ul>	
<b>Group Formation Requirements:</b> <ul style="list-style-type: none"> <li>Students participate as individual learners or in small discussion groups.</li> <li>Post-lecture reflection summaries prepared in pairs or small groups.</li> </ul>	

### Annexure-III

S. No	Topics
1	Training
<b>Description:</b> A one-day training program conducted by NDRF provides students with practical exposure to disaster preparedness, response protocols and emergency coordination mechanisms. The training emphasizes real-time decision-making, safety procedures, use of technology in disaster response and the role of engineers in supporting disaster mitigation and resilience.	
<b>Key Objectives:</b> <ul style="list-style-type: none"> <li>To familiarize students with standard operating procedures and best practices in disaster response and emergency management.</li> <li>To understand the application of technology and engineering support systems in real-life disaster scenarios.</li> </ul>	
<b>Group Formation Requirements:</b> <ul style="list-style-type: none"> <li>Students will be organized into groups of 8–10 to simulate emergency response teams.</li> <li>Each group will assign roles such as team leader, communication coordinator, safety officer and technical support member to ensure effective participation.</li> </ul>	