

DISCIPLINE SPECIFIC ELECTIVES (DSE-EVS-9): NATURAL HAZARDS & DISASTER MANAGEMENT

CREDIT DISTRIBUTION, ELIGIBILITY AND PRE-REQUISITES OF THE COURSE

Course title & Code	Credits	Credit distribution of the course			Eligibility criteria	Pre-requisite of the course
		Lecture	Tutorial	Practical/ Practice		
DSE-EVS-9: NATURAL HAZARDS & DISASTER MANAGEMENT	4	2	0	2	Class XII pass	NA

Learning objectives

The Learning Objectives of this course are as follows:

- Gain insights into the types and causes of natural hazards and their potential impacts on individuals and communities.
- Examine the socio-economic, and environmental factors contributing to disaster risk and vulnerability
- Identify principles of disaster risk reduction and management, including mitigation, preparedness, response, and recovery.
- Understand different perspectives of disaster management, including ethical social and cultural
- Analyze the critical linkages between climate change and natural hazards and prepare plans for disaster preparedness, emergency response and recovery

Learning outcomes

After successful completion of this course, students will be able to:

- Identify a specific risk of natural hazards to the given locality or community conduct a hazard assessment and identify potential weaknesses in disaster preparedness of a local community or infrastructure
- Develop an emergency preparedness plan for their residential colony highlighting evacuation routes, emergency contacts, and supplies
- Design a communication plan for disaster response and recovery operation and develop a disaster risk reduction plan for mitigation, preparedness, response, and recovery
- Evaluate the relevance of GIS mapping, remote sensing, and social media in disaster response and recovery plans and examine the associated issues, such as equity, justice, and human rights

SYLLABUS OF DSE-EVS-09

Theory (02 Credits: 30 lectures)

UNIT – I Natural Hazards and Disasters Basics (2½ Weeks) (5 lectures)

Natural hazards and disasters: definition, classification (geological, meteorological, hydrological, biological), causes (plate tectonics, climate change, etc.), social and economic effects; Historical and recent natural disasters and their impacts, Disaster risk reduction and management frameworks, International disaster response mechanisms, Disaster preparedness and mitigation strategies

UNIT – II Geological Hazards (2 Weeks) (4 lectures)

Earthquakes: causes, prediction and warning systems, Seismic hazards and risk assessment, Tsunamis: causes and early warning systems; Volcanic hazards and eruptions: risk assessment and mitigation strategies; Landslides: causes and impacts

UNIT – III Meteorological Hazards (2 Weeks) (4 lectures)

Causes and impacts of: hurricanes, typhoons, cyclones, tornadoes, thunderstorms and lightning, floods and flash floods, drought, heat waves, wildfires; Climate change and its impact on meteorological hazards

UNIT – IV Hydrological Hazards (2 Weeks) (4 lectures)

Causes and impacts of: river flooding, coastal flooding and storm surges, dam and levee failures, urban flooding, groundwater depletion and contamination; Water scarcity and its effects on society, Water management and conservation strategies, Climate change and hydrological hazards

UNIT – V Biological Hazards (2 Weeks) (4 lectures)

Pandemics and epidemics, Zoonotic diseases and their transmission, Vector-borne diseases and their prevention, Foodborne diseases and their causes, Bioterrorism and its impacts, Environmental health and its relationship to natural hazards, Health systems and emergency response to biological hazards, One Health approach to disaster management

UNIT – VI Technological Hazards (2 Weeks) (4 lectures)

Causes and consequences of hazards, such as: industrial accidents, nuclear accidents, chemical spills, transportation accidents, and cybersecurity threats; Communication technologies and their role in disaster response, Technological risk assessment and mitigation strategies, Relationship between technological hazards and natural hazards

UNIT – VII Disaster Response and Recovery: Policy and ethics (2½ Weeks) (5 lectures)

Emergency response, Disaster recovery and reconstruction, Psychological impacts of disasters, Gender and disaster response, Social vulnerability and disaster risk reduction, Community resilience and disaster preparedness, Role of government and international community

Disaster risk reduction policies and frameworks, Environmental ethics and human rights in disaster response and recovery, and disaster management, Stakeholder engagement public-private partnerships, Legal frameworks and liability, Innovation and technology in future

Teaching and learning interface for theoretical concepts

To achieve the course objectives and match with the contents, a wide range of teaching and learning tools will be employed, including (a) Formal lectures; (b) Interactive sessions using visual aid; (c) Case study analyses; (d) Hypothetical scenario building; (e) Group discussion on key topics; and (f) documentary screening and critical analyses.

Practicals/Hands-on Exercises – based on theory (02 Credits: 60 hours)

1. Conduct a hazard assessment of your college or a given locality or local community to identify the vulnerability to most likely natural hazards and its potential impacts
2. Develop an emergency preparedness plan for the area investigated in practical 1, highlighting evacuation routes, emergency contacts, and supplies
3. Conduct a disaster simulation exercise in the area selected in practicals 1 and 2 to practice emergency response skills
4. Analyze disaster preparedness plan of a local community or infrastructure, assess vulnerability, and identify potential weaknesses for improvement
5. Analyze a recent case study of natural disaster from India or the country of your choice and critically evaluate its socio-economic impacts, including effects on housing, healthcare, and employment
6. Design a communication plan for an effective disaster response and recovery operation,
7. Develop a plan to reduce the risk of disasters for a community giving details of mitigation, preparedness, response, and recovery
8. Analyze the risk of a critical infrastructure system of your city including transportation network or power grid and identify vulnerabilities and potential consequences of failure
9. Examine the climate change scenarios and assess the potential for increased frequency and intensity of natural hazards in a given area
10. Analyze a recent case study on natural disaster and evaluate the emerging importance of technology use in disaster response and recovery, including GIS mapping, remote sensing, and social media
11. Identify the populations vulnerable to possible natural disasters in an area and develop a specific plan for the preparedness of low-income communities, elderly populations, and people with disabilities
12. Analyze different components of Community Emergency Response Team (CERT) training or community-based disaster preparedness programme

Teaching and learning interface for practical skills

To impart training on technical and analytical skills related to the course objectives, a wide range of learning methods will be used, including (a) laboratory practicals; (b) field-work exercises; (c) customized exercises based on available

data; (d) survey analyses; and (e) developing case studies; (f) demonstration and critical analyses; and (h) experiential learning individually and collectively.

Essential/recommended readings

- Birkmann, J., Cardona, O. D., & Carreño, M. L. (2018). *Risk Analysis of Natural Hazards: Interdisciplinary Challenges and Integrated Solutions*. Springer.
- Cutter, S. L. (2019). *Hazards, Vulnerability and Environmental Justice*. Routledge.
- Dash, N. (2018). *Climate Change and Disaster Risk Management*. CRC Press.
- Keller, E., DeVecchio, D., & Galloway, D. (2021). *Natural Hazards: Earth's Processes as Hazards, Disasters, and Catastrophes*. Pearson.
- Musaazi, M., Cunha, R., & Kibreab, M. (2019). *Disaster Risk Reduction and Management Approaches*. Springer.
- Smith, K. (2019). *Environmental Hazards: Assessing Risk and Reducing Disaster*. Routledge.

Suggestive readings

- Berke, P. R., & Beatley, T. (2017). *Planning for Resilience: Handbook for Practitioners*. Island Press.
- Comfort, L. K. (2019). *Crisis Management and Emergency Planning: Preparing for Today's Challenges*. Routledge.
- Li, J., & Chen, Y. (2021). *Risk Management of Natural Disasters: A Comparative Study of the Role of Governments*. Springer.
- Okuyama, S., & Chang, R. (2018). *Managing Natural Disasters through Public-Private Partnerships*. Springer.
- Wisner, B., Gaillard, J. C., & Kelman, I. (2019). *The Routledge Handbook of Disaster Risk Reduction Including Climate Change Adaptation*. Routledge.

Note: Examination scheme and mode shall be as prescribed by the Examination Branch, University of Delhi, from time to time.