Dartmouth Flood Observatory: https://floodobservatory.colorado.edu/

Data Portal (National Center for Seismology): https://seismo.gov.in/data-portal

Earthquake Catalog (USGS): https://earthquake.usgs.gov/earthquakes/search/

European Soil Data Centre (ESDAC): https://esdac.jrc.ec.europa.eu/

India Meteorological Department: www.imd.gov.in

India Water Resources Information System: https://indiawris.gov.in/

Intergovernmental Panel on Climate Change: www.ipcc.ch

Irrigation & Waterways Department, Government of West Bengal: https://wbiwd.gov.in/

National Atlas and Thematic Mapping Organisation: https://portal.natmo.gov.in/en/

National Bureau of Soil Survey and Land Use Planning: https://nbsslup.icar.gov.in/

Soil & Land Use Survey of India (SLUSI): https://slusi.da.gov.in/

SoI, National Survey and Mapping Organization: https://indiamaps.gov.in/login

<table>
<tr><td colspan="2">Programme: UG</td><td colspan="2">Year: I</td><td colspan="2">Semester: I</td></tr>
<tr><td colspan="6">Discipline: Geography</td></tr>
<tr><td colspan="6">Course Name: Disaster Management</td></tr>
<tr><td colspan="6">Course Code: MDC104</td></tr>
<tr><td colspan="2">Course Type: MD (Theoretical)</td><td colspan="2">Course Details: MDC-1</td><td colspan="2">L-T-P: 2 - 1 - 0</td></tr>
<tr><td colspan="2" rowspan="2">Course Credit: 3</td><td rowspan="2">Full Marks: 50</td><td colspan="2">CA Marks</td><td colspan="2">ESE Marks</td></tr>
<tr><td>Practical</td><td>Theoretical</td><td>Practical</td><td>Theoretical</td></tr>
<tr><td colspan="2"></td><td>---</td><td>15</td><td>---</td><td>35</td></tr>
<tr><td colspan="6">Course Objectives:
✧ This course has been framed with an intention to broaden the dimensions of disaster science education.
✧ It is innovative and knowledge oriented to attract bright students to critically understand the strengths and weaknesses of disaster management approaches, planning, and programming in India.</td></tr>
<tr><td colspan="6">Learning Outcome:
✧ Students will have in-depth knowledge about the different parameters during any disaster, which are critical to all life forms, especially humans, in a sustainable way.
✧ Students will familiarize about the mitigation measures to prevent and mitigate different disasters.</td></tr>
<tr><td colspan="6">Professional Skill Development:
✧ The students will definitely assist people regarding risk reduction from any disaster.
✧ This knowledge will help to provide inputs on the basic concepts that underlie much of the United Nations Sustainable Development Goals on reducing the adverse effects of natural disasters.</td></tr>
</table>

Sub units	Topics to be covered	No. of Lectures
Unit I: Basic Concepts and Management [15 Hours]		
1.1	Basic concepts: Definition and types of hazard and disaster (Natural, quasi-natural and man-made); Vulnerability, Risk and Capacity; Cascading disasters and compound events	3
1.2	Disaster Risk Reduction (DRR) strategy: Pre-disaster, disaster and post-disaster phase - Preparedness, rehabilitation, reconstruction and recovery; Community-based DRR; National Disaster Management Guidelines and Disaster Management Act-2005	5
1.3	Global initiatives: SDG 11 - Target 5 (Reduce the adverse effect of natural disasters), Sendai Framework (DRR), Global Facility for Disaster Reduction and Recovery (GFDRR)	3
1.4	National initiatives: Role of institutional framework in disaster management (NDMA-SDMA-DDMA, NDRF, Civic volunteers, NIDM); Disaster Management Support by NRSC, ISRO Bhuvan Portal (Real-time GIS-based disaster database of India)	4
Unit II: Disaster Specific Case Studies [15 Hours]		
2.1	Earthquake: Factors, vulnerability, consequences and management. Tsunami: Factors, vulnerability and management; Role of Indian Tsunami Early Warning Centre (ITEWC); Case study of Indian Ocean Tsunami 2004	4
2.2	Floods: Meteorological and Outburst Floods (GLOF, LLOF, Avalanche) - causes, consequences and management; Case study of Bengal's Millennium Flood, 2000. Drought: Meteorological, hydrological and agricultural droughts - factors, vulnerability and management	3
2.3	Landslide: Factors and vulnerability; Major problems and mitigation strategy for landslides in Himalayan region; Case study of Darjeeling landslides. Cyclone: Tropical cyclone and storm surge - factors, vulnerability and management	4
2.4	Mining disasters: Open cast and shaft mining - vulnerability and management; Case study of Asansol-Raniganj coalfield. Industrial disasters: Gas and radiation leaks, oil spills - vulnerability and management	4

✧ Course Evaluation:

- **Continuous Assessment: 15 Marks**

1. Project report: One Project Report is to be prepared and submitted based on any one case study among the above disasters from West Bengal, incorporating a preparedness plan. The report should be prepared on secondary data and handwritten on A4 page in candidates' own words, not exceeding 2,000 words excluding references. [**10 Marks**]

2. Viva-voce based on project report [**5 Marks**]

- **End Semester Examination: 35 Marks**

The end semester examination shall be conducted based on written test.

Question Pattern: Students have to answer One questions carrying **10 marks** out of given **two** questions; Two questions carrying **5 marks** each out of given **four** questions; Five questions carrying **2 marks** each out of given **eight** questions; Five questions carrying **1 mark** each out of given **eight** questions.

✧ References

BOOKS:

Central Water Commission (1987): Flood Atlas of India. CWC, New Delhi.

Central Water Commission (1989): Manual of Flood Forecasting. New Delhi.

Clague, J.J. and Stead, D. (Eds.) (2012): Landslides: Types, Mechanisms and Modeling. Cambridge University Press.

Coch, N.K. (1994): Geohazards: Natural and Human, Pearson College.

Dewan, A. (2013): Floods in a Megacity: Geospatial Techniques in Assessing Hazards, Risk and Vulnerability, Springer, Dordrecht.

Government of India (2008): Vulnerability Atlas of India, Building Materials & Technology Promotion Council, Ministry of Urban Development, Government of India.

Government of India (2011): Disaster Management in India, Ministry of Home Affairs, New Delhi.

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Nishith, R. and Singh, A.K. (2012): Disaster Management in India: Perspectives, Issues and Strategies. New Royal Book Company, Lucknow.

NITI Aayog (2021): Report of the Committee constituted for formulation of strategy for Flood Management Works in entire country and River Management Activities and works related to Border Areas (2021-26). National Institution for Transforming India, New Delhi.

Ramkumar, M. (2009): Geological Hazards: Causes, Consequences and Methods of Containment, New India Publishing Agency, New Delhi.

Singh, R.B. (2005): Risk Assessment and Vulnerability Analysis, IGNOU, New Delhi.

Singh, R.B. (ed.) (2006): Natural Hazards and Disaster Management: Vulnerability and Mitigation, Rawat Publications, New Delhi.

Singh, S. and Singh, J. (2013): Disaster Management, Pravalika Publications, Allahabad.

Sinha, A. (2001): Disaster Management: Lessons Drawn and Strategies for Future, New United Press, New Delhi.

Smith, K. (2013): Environmental Hazards: Assessing Risk and Reducing Disaster, 6th ed, Routledge.

UNDRR (2020): Human Cost of Disasters. An Overview of the last 20 years (2000-2019). Centre for Research on the Epidemiology of Disasters (CRED), United Nations Office for Disaster Risk Reduction (UNDRR).

Wadge, G. (1994): Natural Hazards and Remote Sensing. Proceedings sponsored by the Natural Environment Research Council and National Remote Sensing Centre Limited.

WEBSITES:

Dartmouth Flood Observatory: floodobservatory.colorado.edu

USGS Earthquake Hazards Programme: earthquake.usgs.gov

India Meteorological Department Cyclone Page:

mausam.imd.gov.in/imd_latest/contents/cyclone.php

India Universities and Institutions Network for Disaster Risk Reduction (IUIN-DRR):

iuin-drr.nidm.gov.in/Home

National Disaster Management Authority (NDMA): ndma.gov.in

ESSO-Indian National Centre for Ocean Information Services (INCOIS): incois.gov.in

International Centre for Integrated Mountain Development: icimod.org

National Center for Seismology: seismo.gov.in

United Nations Office for Disaster Risk Reduction: undrr.org

Irrigation & Waterways Department, Government of West Bengal: wbiwd.gov.in

Central Water Commission: cwc.gov.in

Disaster Management Support Services, RSAA/NRSC/ISRO: bhuvan-app1.nrsc.gov.in/bhuvandisaster