	NON MAJOR ELECTIVE	Credits: 02
Course Code / Title	**22NME11 - GEOINFORMATICS**	

Objectives

1) *The major objectives of this course are to introduce the basic concepts of Geoinformatics.*
2) *The course would discuss about components and applications of Geoinformatics.*
3) *The working principles of GIS and GNSS will be discussed in this course.*

Unit: 1	**Introduction:** The realm of Geoinformatics – Development of Geoinformatics - Emerging trends - Multidisciplinary nature – Spatial information and importance – DBMS - Applications of Geoinformatics
Unit: 2	**Basics of Remote Sensing**: Types of Remote Sensing - Interaction of EMR with the atmosphere and the earth surface - Aerial photographs and Types. Photogrammetry - Visual interpretation: Equipment's - Elements of image interpretation.
Unit: 3	**Satellite Remote Sensing:** Types of remote sensor and platforms - Types of resolution - Active and passive remote sensing - Introduction to panchromatic, multispectral and hyperspectral data - Earth observation satellites and Applications.
Unit: 4	**Geographical Information System:** Definition – Development of GIS Technology - Components of GIS – Raster and vector data structures - RDBMS - Spatial referencing - Spatial data input and editing - GIS analysis – Web GIS - Applications.
Unit: 5	**Global Navigation Satellite System:** Segments: space segment - GPS Satellite systems – New programmes – IRNSS - Control segment - Satellite tracking - User segment – Modern survey instruments – Error sources – Satellite augmented systems - DGPS - GNSS Applications.

Unit: 6 Current Contours: [Not for Examination]

Mobile mapping-location based services-Google API. GeoAI, Real-time GIS, Machine learning.

References:

1. Agarwal, N. K., (2006). Essentials of GPS, Geodesy and GPS publications, Hyderabad.
2. Anand P.H and Rajesh Kumar V, (2003) Principles of Remote Sensing and GIS Sri Venkateswara Publishers,Kumbakonam.
3. Burrough, P. A., & McDonnell, R., (2000). Principles of Geographical Information Systems, Oxford Press, London.
4. Chandra, A. M. (2017). Geoinformatics. India: New Academic Science.
5. Claudia, K., Stefan, D., 2014. Quantitative Remote Sensing in Thermal Infrared, 11, Springer.
6. Gomarasca, M. A. (2009) Basics of Geometrics, Springer Science, New York
7. Gupta, R. K. (2014). Principles Of Geoinformatics. India: Jain Brothers.
8. Lillisand T.M and R.W. Kiefer (1994) Remote Sensing and Image Interpretation. John Wiley & Sons, New York.
9. Noel Lane (2022) Geoinformatics: Methods and Applications. United States: Callisto Reference.
10. Peter Atkinson (2009) Geoinformatics - Volume I. United Kingdom: EOLSS Publications.

Web Sources

1. *https://www.esri.com/en-us/what-is-gis/history-of-gis*
2. *https://photographycourse.net/types-of-aerial-photography/*
3. *https://www.mlsu.ac.in/econtents/1290_TYPES%20OF%20PLATFORMS%20AND%20SENSORS.pdf*
4. *https://www.unoosa.org/oosa/en/ourwork/psa/gnss/gnss.html*
5. *https://www.ursc.gov.in/navigation/irnss.jsp*

Course Outcomes:

At the conclusion of the course the successful student will be able to:

1. *Understand the concepts and applications of GIS and GNSS.*
2. *Acquire knowledge to collect, analyse, store, manipulate and display the spatial data.*
3. *Explain the concepts of remote sensing and image processing techniques.*
4. *Understand and able to solve the real time problems using GIS.*
5. *Enhances the knowledge on image pre-processing and image enhancement.*
6. *Familiarize with the working principles of DGPS.*
7. *Manage sustainably the natural resources with the help of Geoinformatics.*
8. *Attain the knowledge for studying present and future scenario of various natural phenomenons.*

	NON MAJOR ELECTIVE	Credits: 02
Course Code / Title	**22NME12 - DISASTER STUDIES**	

Objectives

1. *The objective of this course is to provide students an exposure to disasters, their significance*
2. *Various types of disaster and risk managements were discussed.*
3. *This multidisciplinary course will also enable students to recognize the increasing vulnerability of the planet in general and India in particular to disasters.*

Unit: 1	**Introduction:** Concepts and Terminologies: Disaster, Hazard, Catastrophes, Emergency, Risks, Vulnerability - Types of Disasters - Trends - Impacts: Physical, Social, Economic, Political, Environmental and Psychosocial - Resilience.
Unit: 2	**Natural Disasters:** Geophysical: Earthquakes, Tsunamis, Landslides and Volcanoes - Hydrological: Floods and Avalanches - Meteorological: Cyclones, Drought, Extreme Temperatures and Wildfires - Biological: Disease Epidemics and Insect / Animal Plagues.
Unit: 3	**Anthropogenic Disasters:** Atmospheric Disasters: Global Warming, Ozone Depletion, Acid Rain, Snow Melt, Sea Level Rise - Chemical / Industrial Disasters: Fire Accidents, Nuclear Disasters, Mining, Chemical Pollution, Oil spill and Industrial Waste - Biological Disasters: Deforestation, Bio-Diversity Loss and Coral / Mangrove Depletion - Others: Stampede, Conflicts, Terrorist attacks and Transport Accidents.
Unit: 4	**Disaster Risk Management:** Management Cycle: Response and recovery, Risk Assessment, Mitigation and Prevention, Preparedness Planning, Prediction and warning - Indigenous Knowledge - Community Based Disaster Management - Role of Geoinformatics - Do's and Don'ts During Disasters.
Unit: 5	**Disaster Management in India:** Hazard and Vulnerability Profile of India - Institutional Framework: Disaster Management Act - Policy and Guidelines - International Strategy for Disaster Reduction.

Unit: 6 Current Contours: Not for Examination Only for Discussion

- Long history of standardized data compilation, validation and analysis
- Rational decision-making in disaster situations.
- Providing information on the human impact of disasters
- Creating awareness in disaster preparedness

References:
1. Carter, N. (1991), Disaster Management: A Disaster Manager's Handbook. Asian Development Bank, Manila.
2. Chandan Ghosh, Dookie Kim, Pijush Samui (2018), Integrating Disaster Science and Management: Global Case Studies in Mitigation and Recovery. Netherlands: Elsevier Science.
3. Clements, B., Casani, J. (2016), Disasters and Public Health: Planning and Response. Netherlands: Elsevier Science.
4. Etkin, D. (2014). Disaster Theory: An Interdisciplinary Approach to Concepts and Causes. Netherlands: Elsevier Science.
5. Govt. of India (2008), Vulnerability Atlas of India. BMTPC, New Delhi.
6. Govt. of India (2011), Disaster Management in India. Ministry of Home Affairs, New Delhi.
7. Janki Andharia,(2020), Disaster Studies: Exploring Intersectionalities in Disaster Discourse. Singapore: Springer Nature Singapore.
8. Kapur, A. (2010), Vulnerable India: A Geographical Study of Disasters, Sage Publication, New Delhi.
9. Modh, S. (2010), Managing Natural Disaster: Hydrological, Marine and Geological Disasters, Macmillan, Delhi.
10. Savindra S. and Jeetendra S. (2013), Disaster Management, Pravalika Publications, Allahabad.

Web Sources

1. *http://www.ndma.gov.in/en/*
2. *http://nidm.gov.in/*
3. *http://www.imd.gov.in/*
4. *https://www.unisdr.org/*

Course Outcomes:

On completion of the course the student will:

1. *Know about hazards, disasters and catastrophes and also Disaster Management*
2. *Gain knowledge about causes and effects of Earthquakes, Volcanic hazards, Landslide and GIS case studies for earthquake, volcano and landslide.*
3. *Acquire knowledge on Origin, types, effects and damage assessment of Cyclones and Floods*
4. *Learn about preparation of GIS based parameters and layers and flood prone area analysis and management, risk assessment and also GIS case studies for cyclones and floods.*
5. *Know about causes and an effect of Drought and Desertification, GIS based management strategies and also GIS case studies for drought and desertification.*
6. *Able to Study about Atmospheric Disasters like Ozone layer depletion, green house / global warming, acid rain, snow melt, sea level rise related problems and GIS case studies for Atmospheric Disasters.*
7. *Able to study about Nuclear, Chemical / Industrial and Mining Disasters and also Marine Disasters like Oil spill and chemical pollution, coastal erosion and deposition and also coastal zone management strategies and GIS case studies for anthropogenic disasters.*
8. *Study about Biological Disasters like Epidemics, Ecological degradation, bio-diversity loss, population extinction, Coral / mangrove depletion, forest fire and GIS case studies and also about Disaster Management, Central and State Governments of India in Disaster Management, Institutional and Policy Framework, Disaster Prevention and Mitigation etc*