PANJAB UNIVERSITY, CHANDIGARH-160014 (INDIA)

(Estd. under the Panjab University Act
VII of 1947- enacted by the Govt. of India)

FACULTY OF ARTS

SYLLABI

FOR

MASTERS IN DISASTER MANAGEMENT

(SEMESTER SYSTEM)

Examinations, 2023-24, 2024-25 & 2025-26

APPLICABILITY OF REGULATIONS FOR THE TIMEBEING IN FORCE

Notwithstanding the integrated nature of a course spread over more than one academic year, the regulations in force at the time a student joins a course shall hold good only for the examinations held during or at the end of the academic year. Nothing in these regulations shall be deemed to debar the University from amending the regulations subsequently and the amended regulations, if any, shall apply to all students whether old or new.

MASTERS IN DISASTER MANAGEMENT
(Semester System)
Outlines of Course Content and Syllabi
forthe examination 2023-24, 2024-25 & 2025-26

ABOUT THE COURSE

Masters in Disaster Management is a professional postgraduate course offered to innovative and motivated minds from across the academic and professional fields who are inclined to contribute in creating disaster resilience in society. The Department of Geography, Panjab University Chandigarh has been a pioneer in introducing such professional courses of contemporary relevance. We first introduced a PG Degree course in Disaster Management in 2008 which since then has been restructured, upgraded and updated consistently with changing disaster scenario, management strategies and policies.

Keeping pace with changing global, national and local disaster scenario and recognising the need to develop our society in a sustainable manner, this course offers innovate, multi-disciplinary, flexible and robust course content that caters to the needs of different aspects and dimensions of disaster management. This two-year course divided into four semesters is designed to inculcate professional attitude with sound understanding of theoretical, conceptual and field-based knowledge among students so that they can fulfil the increasing demand for disaster management skilled professionals who deliver proficiently.

WHY STUDY WITH US

Department of Geography, Panjab University offers uniquely designed dynamic professional course that not only produces highly trained professionals but also instils humane qualities in its students so that they contribute in making this nation resilient to ever increasingly precarious world. During the two years stay with us, students are exposed to a wide range of knowledge-learning and character-building practices. We offer a wide spectrum of learning skills ranging from conceptual and theoretical clarity of the subject, technical capabilities, analytical capacities, understanding of social, economic, political and humanitarian contexts of disaster mitigation, preparedness, response, risk reduction and disaster proofing. Trained through a focussed field-workand learning by doing based approach, we prepare our students to develop practical understanding of processes, mechanisms and operational aspects of disaster management.

Some of the highlights of our curriculum are:

- Conceptual and theoretical underpinnings of disaster management.
- Understanding of mechanisms and processes of hazards and disasters.
- Global and regional scenarios of disaster manifestation.
- Focussed training on disaster response and emergency management.
- Focus on risk reduction and community participation.
- Understanding of disaster management procedures, practices and policies.
- Sensitization on social, cultural and economic dimensions of disaster management.
- Technical skill development through Geospatial technology.
- Scientific training in Hazard zonation and risk analysis.
- Specialization in Urban and Industrial hazard risk reduction.
- Focussed research skills and project management.

ELIGIBILITY CRITERIA

❖ The eligibility for admission to the course shall be as follows:

- Graduation in any discipline with at least 50% marks in aggregate from Panjab University or from any other University recognized by the Panjab University as equivalent thereto. The admission to the course shall be through an Entrance Test.

- All candidates, except those sponsored by the Government/Semi-Government Organisations and Institutions, will be required to qualify the Entrance Test conducted by the Panjab University, Chandigarh. The apportioning of weightages for the purpose of preparing the merit list will be as follows:

  Entrance Test: 50%
  Qualifying Examination (Bachelor's Degree): 50%

  Academic and other weightage(s), if any, shall be based on the percentage of marks obtained by the eligible candidates in the Qualifying Examination (Bachelor's Degree) as prescribed and admissible under Panjab University Rules.

GUIDELINES FOR CONTINUOUS INTERNAL ASSESSMENT (20%)

For Regular Students of Masters in Disaster Management (Semester System)
(Effective from the First Year Admissions for the Academic Session 2023-2024)

1. The Syndicate has approved the following guidelines, mode of testing and evaluation including Continuous Internal Assessment of Students:

i. Terminal Evaluation : **80%**(Theory 50% and Practical 30% as specified in syllabus)
ii. Continuous Assessment:**20%**
iii. Continuous Assessment may include written assignment, snap tests, participation in discussions in the class, term papers, attendance etc.
iv. In order to incorporate an element of Continuous Internal Assessment of students, the colleges/ Departments will conduct one written test as quantified below:

a) Written Test	: 25 (reduced to 5)
b) Snap Test	: 25 (reduced to 5)
c) Term Paper	: 25 (reduced to 5)
d) Participation in class discussions	: 15 (reduced to 3)
e) Attendance	: 10 (reduced to 2)

Total: 100 reduced to 20

2. Weightage of 2 marks for attendance component out of 20 marks for Continuous Assessment shall be available only to those students who attend 75% and more of classroom lecture/ seminars/ workshops. The break-up of marks for **attendance component** for theory papers shall be as under:

Attendance Component	*Marks for Theory Papers*
(a) 75% and above upto 85%	**: 1**
(b) Above 85%	**: 2**

3. It shall **not be compulsory** to pass in Continuous Internal Assessment. Thus, whatever marks are secured by a student out of 20% marks, will be carried forward and added to his/her score out of 80%, i.e., the remaining marks allocated to the particular subject and, thus, he/she shall have to secure pass marks both in the University examinations as well as total of Internal Continuous Assessment and University examination.

4. Continuous Internal Assessment awards from the affiliated Colleges/Departments must be sent to the Controller of Examinations, by name, **two weeks before** the commencement of the particular examination on the *proforma* obtainable from the Examination Branch.

Masters in Disaster Management COURSE OUTLINE			
SEMESTER-I			
Course Code	**Course Title**	**Max. Marks**	**Credits**
DM 101	Foundations of Disaster Management	100	4
DM 102	Natural Hazards and Disasters	100	4
DM 103	Human Made Hazards and Disasters	100	4
DM 104	Fundamentals of Geoinformatics	100	4
	Semester Total	***400***	***16***
SEMESTER-II			
Course Code	**Title**	**Max. Marks**	**Credits**
DM 201	Global Initiatives for Disaster Management	100	4
DM 202	Disaster Management Mechanisms in India	100	4
DM 203	Incident Response System and Emergency Management	100	4
DM 204	Disaster Risk Reduction and Management Planning	100	4
	Semester Total	***400***	***16***
SEMESTER-III			
Course Code	**Title**	**Max. Marks**	**Credits**
DM 301	Research Methodology and Internship Report	100	4
DM 302	Industrial Safety and Risk Management	100	4
DM 303	Urban Disasters and Risk Management	100	4
DM 304	Geoinformatics for Disaster Management	100	4
	Semester Total	***400***	***16***
SEMESTER-IV			
Course Code	**Title**	**Max. Marks**	**Credits**
DM 401	Dissertation		
	1. Formulation of Research Proposal	50	
	2. Mid Term appraisal	50	
	3. Pre-submission Presentation	50	16
	4. Dissertation Evaluation	150	
	5. Presentation	50	
	6. Viva-voce	50	
	Semester Total	***400***	***16***
	GRAND TOTAL (Semester-I, II, III, IV)	**1600**	**64**

NOTE:

1. The minimum marks required to pass the examination shall be 50% in aggregate in each semester and 45% in each individual paper: (i) theory paper, (ii) practical examination, (iii) internship report and (iv) Dissertation.
2. A candidate, who fails in a particular semester, shall be allowed to re-appear in the subsequent semester with a maximum of two chances to be availed consecutively for the respective semester.
3. A candidate who fails in one or more theory and/or practical/internship report/dissertation examination/s shall be allowed to re-appear in the subsequent semester with a maximum of two chances to be availed consecutively in the respective theory and/or practical/internship report/dissertation examination/s.
4. The Internship Report shall be prepared by the candidate on the basis of work done or experience gained on visit(s) to Disaster Management Centre(s)/Institute(s)/NGO(s) in India. The candidate shall submit three copies of his/her Internship Report ten days before the commencement of the theory examination of the said semester.
5. In case of dissertation, the Board of Control shall assign Supervisor/Co-supervisors for each candidate for supervising candidate's dissertation on an approved topic. External Supervisor/Co-supervisors may be allotted, subject to their eligibility to be determined by the Board of Control.

SEMESTER-I

DM 101: FOUNDATIONS OF DISASTER MANAGEMENT

Max. Marks: 100
Theory Paper: 80
Internal Assessment: 20

Objectives: To familiarize the students with the concepts and terminologies of Disaster Management and to inform them about the prospects of a Disaster Manager.

COURSE CONTENT

Unit-I

Basic Concepts of Disaster Management

i. Hazard and Disaster: Definition; Classification; Levels; Models (PAR and Access)
ii. Risk: Definition; Factors of disaster risk; Disaster Risk analysis.
iii. Vulnerability: Definition; Types (physical vulnerability, socioeconomic vulnerability, vulnerability related to gender and age, rural & urban vulnerability); Vulnerability analysis. Inter-relationship between Hazard, Vulnerability and Risk.
iv. Capacity: Coping capacity; Capacity assessment and Capacity development.
v. Disaster Management: Definition; Elements; Scope, Significance; DM Cycle.

Unit-II

Disaster Risk Management

vi. Minimizing Disaster Risk: Preparedness, Mitigation and Prevention – definition, specific interventions (required for each); procedure and role of various stakeholders
vii. Preparedness: Awareness generation; Information management; Early warning dissemination system; Community participation – Task force formation; Training and Capacity building; Preparedness plan preparation.
viii. Mitigation: Knowledge of disaster specific risk; Analyzing disaster damages and possible interventions for minimizing the impact of disaster; Preparation of Mitigation plan.
ix. Prevention: Analysing the nature of a hazard and ways of minimizing its intensity; Preparation of disaster prevention plan.
x. Disaster Risk Management (DRM) Plan: Preparing Hazard-Vulnerability profile; Stakeholder analysis; Disaster risk assessment; Incorporation of Preparedness, Mitigation and Prevention plans. Implementation of DRM plan**.**

Unit-III

Emergency Response and Crisis Management

xi. Crisis Management: Rescue, relief, rehabilitation & reconstruction; Crisis Management plan.
xii. Emergency Response: Standard Operation Procedure (SOP) for disaster response; Information Management System; Warning Dissemination; Evacuation; Search and Rescue operations; Relief operations; Emergency Operation Center (EOC);
xiii. Resource Management & Networking: Role of Disaster Response Forces and Community Based Organizations (CBO) in emergency response mechanism.
xiv. Relief Operations: Arranging for Shelter, Food, Safe drinking water, Sanitation and Medical aids; Role of NGOs and Health workers in relief operations; Maintaining law and order.

Unit-IV

Recovery, Rehabilitation and Reconstruction

xv. Recovery:Decisions and actions related to rehabilitation and reconstruction taken after a disaster with a view to restoring or improving the pre-disaster living conditions of the affected community; Encouraging and facilitating necessary adjustments to reduce disaster risk.
xvi. Rehabilitation: Damage Assessment; Need analysis of disaster affected people; Resource mobilization for rehabilitation; Restoration of basic amenities–housing drinking water, sanitation, medical facilities, power supply etc.; Creating Livelihood options.
xvii. Reconstruction: Repair and reconstruction of roads, bridges, crossways, buildings, structures and establishments damaged in the disaster; Restoration of operations of the service sector.
xviii. Documenting disaster; Lessons learnt; Updating DRM Plan for risk mitigation.

Note:

1. A compulsory question containing 15 short answer type questions shall be set covering the whole syllabus. The student shall attempt any 10 questions in about 25-30 words each. Each question shall carry 2 marks (total 20 marks).
2. A total of 8 questions will be set out of the whole syllabus, at least *2* from each unit. The candidates will attempt *4* questions selecting 1 from each unit. These will be in addition to the compulsory question at serial number 1 and each question will carry 15 marks (total 60 marks).
3. Internal assessment shall be based on Written Test, Snap Test, Participation in Class discussion, Term Paper and Attendance as prescribed by the University
4. For reappear/improvement candidates(s), who have not been assessed earlier for internal assessment, the marks secured by them in theory paper will be increased proportionally to maximum marks of the paper in lieu of internal assessment. **The paper setter must put note (4) in the question paper.**

LIST OF READINGS

Essential Readings:

1. Anderson, M. and P. Woodrow. *Rising from the Ashes: Development Strategies in Times of Disaster*. UNESCO and West view Press, Inc., Colorado, 1989.
2. Beatley, Timothy. *The Vision of Sustainable Communities, In Burby, Raymond (ed.), Cooperating with Nature: Confronting Natural Hazards with Land-Use Planning for Sustainable Communities*, Washington, D.C., Joseph Henry Press, 1998.
3. FEMA. *Planning for a Sustainable Future: The Link between Hazard Mitigation and Livability*. Washington, D.C., 2000.
4. Godschalk, D. R., Timothy B., P. Berke, D.J. Brower and E.J. Kaise. Natural *Hazard Mitigation; Recasting Disaster Policy and Planning*, Washington, D.C. Island Press, 1999.
5. Greg, Bankoff and others. *Mapping Vulnerability: Disasters, Development and People,* Earthscan Publishers, London, 2004.
6. International Federation of Red Crescent Societies, World Disaster Report: Focus on Community Resilience, 2004.
7. Kasperson, J.X., Kasperson, R.E. and Turner, B. L. *Regions at Risk: Comparisons of Threatened Environments*, United Nation, University Press, Tokyo, 1995.
8. Mark P.*Natural disasters and development in a globalizing world*, Routledge, London, 2003.
9. *https://www.unisdr.org/we/inform/terminology*

Further Readings:

1. Anderson M. *Disaster Vulnerability andSustainable Development: A General Framework for Assessing Vulnerability*, Cambridge, 1993.
2. Burton, I., Kates, R.W. and White, G.F. *Environment as Hazard*, 2nd edition, Guilford Press, New York, 1993.
3. Anu Kapur. *Vulnerable India: A Geographical Study of Disasters*, 1st Edition, SAGE, 2010.
4. Chakraborty, S.C. *Natural Hazards and Disaster Management*, Pragatishil Prakashak, Kolkata, 2007.
5. David Godschalk, Timothy Beatley, Philip Berke, David Brower, Edward J. Kaiser. *Natural Hazard Mitigation: Recasting Disaster Policy and Planning*, Island Press, 1998.
6. Deeptima, Debanjali, Neeti, Roshani, Anu Kapur, Meeta. *Disasters in India: Studies of Grim Reality*, 1st Edition, Rawat Publications, 2005.
7. UNDP Disaster Management Training Programme. *An Overview of Disaster Management, 1992*.

Pedagogy: All matters pertaining to basic concepts, approaches and theories of Disaster management are to be examined and explained by way of asking the students to prepare reports on specific issues and problems. Emphasis will be placed more on local problems and their practical dimensions.

DM 102: NATURAL HAZARDS AND DISASTERS

Max. Marks: 100
Theory Paper: 50
Practical (File Record and Viva Voce: 20+10): 30
Internal Assessment: 20

Objectives: To introduce the students to the idea and nature of natural hazards and disasters. Students shall be acquainted with mechanisms and processes of natural hazards, their disastrous manifestations and impacts. The focus shall be on understanding hazards and disasters, with reference to the Indian context.

COURSE CONTENT

Unit-I

i. Concepts of Natural Hazards and Disasters
ii. Catastrophes in Nature: Types of Natural Hazards and Disasters
iii. Predicting Catastrophe and Interconnections Among Natural Hazards

Unit-II

iv. Earthquake and Tsunami
v. Landslide and Avalanche
vi. Volcanic Eruption

Unit-III

vii. Floods and Cloudburst
viii. Cyclone and Associated Hazards
ix. Drought and Desertification

Unit-IV

x. Regional Dimensions of Hazards/Disasters in India.
xi. Geo-tectonic Hazards in India: Earthquakes and Landslides
xii. Hydro-meteorological Hazards in India: Floods and Drought

PRACTICAL EXERCISES

1. Report on Specific Natural Hazard Mechanism and Processes
2. Historical Perspective on Disasters in India
3. Mapping of Hazards and Disasters:
   - Earthquake Prone Areas in India
   - Flood Prone Area in India
   - Wind & Cyclone Zones in India
   - Landslide Hazard Zones in India
   - Drought Prone Areas in India
   - Multi Hazard Prone Areas in India

Note:

1. A compulsory question containing 10 short answer type questions shall be set covering the whole syllabus. The student shall attempt any 7 questions in about 25-30 words each. Each question shall carry 2 marks (total 14 marks).
2. A total of 8 questions will be set out of the whole syllabus, at least 2 from each unit. The candidates will attempt 4 questions selecting 1 from each unit, carrying 9 marks each (total 36 marks). These will be in addition to the compulsory question at serial number 1.
3. Internal assessment shall be based on Written Test, Snap Test, Participation in Class discussion, Term Paper and Attendance as prescribed by the University.
4. For reappear/improvement candidates(s), who have not been assessed earlier for internal assessment, the marks secured by them in theory paper will be increased proportionally to maximum marks of the paper in lieu of internal assessment. **The paper setter must put note (4) in the question paper.**
5. The candidates will be required to carry out practical exercises and submit the practical file record for evaluation. Assessment of practical record and viva-voce will be done by three examiners

consisting of internal, Chairperson of the department and one additional faculty member teaching the course. Distribution of marks: Practical record: 20 marks and Viva-voce Examination: 10 marks. The practical file shall be submitted to the department ten days before the commencement of the theory examination of the semester.

LIST OF READINGS

Essential Readings:

1. Wisner B, Blaikie P., Cannon T. and I. Davis. *At Risk: Natural Hazards, People's Vulnerability, and Disasters,* 2nd Edition, Routledge, London, 2014.
2. Gupta, M.C.; L.C. Gupta, B.K. Tamini, Vinod K. Sharma. *Manual on Natural Disaster Management in India,* National Disaster Management Centre, New Delhi, 2000.
3. Hyndman, D. and D. Hyndman. *Natural Hazards and Disasters*. 5th edition. Cengage Learning, Boston, USA, 2016.
4. Madu, Christian N and Chu-hua Kuei. *Handbook of Disaster Risk Reduction and Management*. World Scientific Publishing Co. Pvt. Ltd, Singapore, 2018.
5. Montz, Burrell E.; Graham A. Tobin and Ronald R. Hagelman. *Natural Hazards: Explanation and Integration*. Second Edition, The Guilford Press, New York, 2017.

Further Readings

1. Alexander, D. E. *Natural Disasters*. London: University College London Press and; Dordrecht and Boston: Kluwer Academic Publishers, 1993.
2. Alexander, D. E. *Confronting Catastrophe: New Perspectives on Natural Disasters*. Harpenden, U.K: Terra Publishing, 2000.
3. Burton, I., Kates, R.W. and White, G.F. *Environment as Hazard*, 2nd edition, Guilford Press, New York, 1993.
4. Kapur, Anu. *Vulnerable India: A Geographical Study of Disasters*, Sage Publications India Pvt. Ltd, New Delhi, 2010.
5. Keller, Edward A and Duane E DeVecchio. Natural Hazards: Earth's Processes as Hazards, Disasters, and Catastrophes. 4th Edition, Routledge, 2016.

Pedagogy: There must be active interaction between teacher and students on different aspects of natural hazards and disasters.The emphasis will be given on group discussion and activities to promote participatory learning on natural hazards and disaster mechanisms and processes.

DM 103: HUMAN MADE HAZARDS AND DISASTERS

Max. Marks: 100
Theory Paper: 80
Internal Assessment: 20

Objectives: Main objective of this course is to sensitize students regarding human made hazards and disasters with a focus on understanding of mechanisms and processes through which humans induce disasters and increase risk potential.

COURSE CONTENT

Unit-I

i. Understanding Human-Made Hazards and Disasters
ii. Linking Development, Environment and Disasters
iii. Disasters and Impact on the Environment

Unit-II

iv. Public Health Emergency and Disaster Management
v. Biological Disasters, Epidemics and Health Hazards
vi. Linking Development and Extremism; Terrorism and Security Issues

Unit-III

vii. Industrial & Technological Disasters
viii. Chemical Disasters and Management
ix. Nuclear and Radiological Emergencies

Unit-IV

x. Air, Water and Soil Pollution
xi. Fire: Coal Fire, Forest Fire, Oil Fire
xii. Local Disasters (Road, Rail, Air and Sea Accidents)

Note:

1. A compulsory question containing 15 short answer type questions shall be set covering the whole syllabus. The student shall attempt any 10 questions in about 25-30 words each. Each question shall carry 2 marks (total 20 marks).
2. A total of 8 questions will be set out of the whole syllabus, at least *2* from each unit. The candidates will attempt *4* questions selecting 1 from each unit. These will be in addition to the compulsory question at serial number 1 and each question will carry 15 marks (total 60 marks).
3. Internal assessment shall be based on Written Test, Snap Test, Participation in Class discussion, Term Paper and Attendance as prescribed by the University
4. For reappear/improvement candidates(s), who have not been assessed earlier for internal assessment, the marks secured by them in theory paper will be increased proportionally to maximum marks of the paper in lieu of internal assessment. **The paper setter must put note (4) in the question paper.**

LIST OF READINGS

Essential Readings:

1. Ahmed, Shaik Iftikhar. *Disaster Management in the Wake of a Flood*, Twenty FirstCentury Publications, Patiala, 2008.
2. Bryant Edwards. *Natural Hazards*, Cambridge University Press, U.K., 2005
3. Carter, W. Nick. *Disaster Management*, Asian Development Bank, Manila, 1991.
4. Central Water Commission. *Flood Atlas of India*, CWC, New Delhi, 1987.
5. Central Water Commission. *Manual of Flood Forecasting*, New Delhi, 1989.
6. Government of India. *Vulnerability Atlas of India*, New Delhi, 1997.
7. Hyndman, D. and D. Hyndman.*Natural Hazards and Disasters*. 5th edition. Cengage Learning, Boston, USA, 2016.
8. Madu, Christian N and Chu-hua Kuei. *Handbook of Disaster Risk Reduction and Management*. World Scientific Publishing Co. Pvt. Ltd, Singapore, 2018.
9. Sahni, Pardeep et al. (eds.). *Disaster Mitigation Experiences and Reflections*,Prentice Hall of India, New Delhi, 2002.

Further Readings:

1. Bilham, R. *The seismic future of cities*. Bulletin of Earthquake Engineering, 7, pp. 839 887, 2009.
2. Bureau of Indian Standards. *Indian Standards: Criteria for Earthquake Resistant Design of Structures, Part I*, Fifth Revision, 2002.
3. Government of India. *Vulnerability Atlas of India*, New Delhi: Building Materials andTechnology Promotion Council, Ministry of Housing & Urban Poverty Alleviation, 1997.
4. Gupta, M.C.; L.C. Gupta, B.K. Tamini, Vinod K. Sharma. *Manual on Natural Disaster Management in India,* National Disaster Management Centre, New Delhi, 2000.
5. Kapur, A. *Disasters in India: Studies of Grim Reality*, Rawat Publications, Jaipur, 2005.
6. Wisner B, Blaikie P., Cannon T. and I. David. *At Risk: Natural Hazards, People's Vulnerability, and Disasters,* 2nd Edition, Routledge, London, 2014.

Pedagogy: The students shall be explained the interactive relationship between disasters and environmental degradation. Extensive use of audio-visual aids will be made. Field trips will be arranged, if feasible.

DM 104: FUNDAMENTALS OF GEOINFORMATICS

Max. Marks: 100
Theory Paper: 50
Practical (File Record and Viva Voce: 20+10): 30
Internal Assessment: 20

Objectives: Main objectives of this course are to introduce the students with the concepts and technologies of earth observation and geoinformatics. This paper aims at developing students' technological capabilities with scientific orientation.

COURSE CONTENT

Unit I

Fundamental Concepts of Remote Sensing

i. Remote Sensing: Concept, Types and Applications
ii. Remote Sensing Platforms, Sensors and Scanning Systems
iii. Major Satellite Systems and their Sensors

Unit-II

EMR Principles and Interaction Mechanisms

iv. Electromagnetic Spectrum; Energy-Atmosphere Interaction
v. Energy-Earth Interaction; Spectral Signatures of Surface Features
vi. Image: Meaning and Types and Characteristics

Unit-III

Fundamentals of Geographic Information Systems:

vii. Definition, Concept, Significance, Component and Applications of GIS
viii. Spatial data base: Types and Representations
ix. GIS Analysis: Buffer, Overlay and Query

Unit IV

Fundamentals of Global Navigational Satellite System

x. Global Navigational Satellite System and its Application
xi. GPS Concept and Principles of Operation, GPS Segment
xii. GPS Positioning, GPS Accuracy and Errors, Major GPS Systems

PRACTICAL EXERCISES

1. Introduction to Wavelength, Frequency and Spectrum
2. Comparing Satellite Imageries of Various Spatial Resolution
3. Analysis of Spectral Signatures of Surface Features
4. Visual/Digital Interpretation of Features from Satellite Imageries
5. Digital Image Interpretation: Unsupervised and Supervised Classification
6. Introduction to GIS Software: Georeferencing, Digitization and Geodatabase
7. Analysis in GIS: Buffer, Query and Overlay Operation
8. Mapping and Map Layouts in GIS
9. GPS: Data Collection and Mapping

Note:

1. A compulsory question containing 10 short answer type questions shall be set covering the whole syllabus. The student shall attempt any 7 questions in about 25-30 words each. Each question shall carry 2 marks (total 14 marks).
2. A total of 8 questions will be set out of the whole syllabus, at least 2 from each unit. The candidates will attempt 4 questions selecting 1 from each unit, carrying 9 marks each (total 36 marks). These will be in addition to the compulsory question at serial number 1.
3. Internal assessment shall be based on Written Test, Snap Test, Participation in Class discussion, Term Paper and Attendance as prescribed by the University.
4. For reappear/improvement candidates(s), who have not been assessed earlier for internal assessment, the marks secured by them in theory paper will be increased proportionally to

maximum marks of the paper in lieu of internal assessment. **The paper setter must put note (4) in the question paper.**

5. The candidates will be required to carry out practical exercises and submit the practical file record for evaluation. Assessment of practical record and viva-voce will be done by three examiners consisting of internal, Chairperson of the department and one additional faculty member teaching the course. Distribution of marks: Practical record: 20 marks and Viva-voce Examination: 10 marks. The practical file shall be submitted to the department ten days before the commencement of the theory examination of the semester.

LIST OF READINGS

Essential Readings:

1. Campbell, J. B. and R.H. Wynne. *Introduction to Remote Sensing* (5thEd.), Guilford Press, 2012.
2. Joseph, G. *Fundamentals of Remote Sensing*, Universities Press, 2005.
3. Gomarasca, Mario A. *Basics of Geomatics*, Springer: Heidelberg, 2009.
4. Harvey, F. A Primer of GIS. Fundamentals of Geographic and Cartographic Concepts, The Guilford Press, New York London. 2008
5. Heywood, I. Conrnelius, S. and Carver, S. An Introduction to Geographical Information Systems, Pearson Education Limited, United Kingdom. 2010.
6. Kaplan, E. D. and C.J. Hegarty (eds.). *Understanding GPS/GNSS: Principles and Applications*, 3rd Edition, Artech House, 2017.
7. Kang-Tsung Chang.*Introduction to Geographic Information Systems*, Tata McGraw-Hill, New Delhi, 2015.
8. Leick, A, Lev Rapoport and Dmitry Tatarnikov.*GPS Satellite Surveying*, 4th Edition, John Wiley & Sons, 2015.
9. Longley, Paul A., Goodchild, Michael F. Maguire, David J., and David W. Rhind.*Geographic Information Systems and Science*, 3rd edition., John Wiley and Sons, England, 2011.
10. Rao, G.S. *Global Navigation Satellite Systems- With Essentials of Satellite Communications*, Tata McGraw Hill Education Private Limited, New Delhi, 2010

Further Readings:

1. Bolstad, P.: GIS Fundamentals.*A First Text on Geographic Information Systems*, 5th Edition, XanEdu Publishing Inc., 2016.
2. Brewer, C.A. *Designing Better Maps: A Guide for GIS Users*, ESRI Press, 2005.
3. Burrough, P. A., McDonnell, R. A. and Lloyd, C.D.*Principles of Geographical Information Systems*, 3rd. ed., Oxford University Press, Toronto, 2016.
4. DeMeers, M.N.*Fundamentals of Geographic Information Systems*, 4th Edition, John Wiley and sons, 2008.
5. Dong, P. and Qi Chen.*LiDAR Remote Sensing and Applications*. Taylor & Francis Group, 2018
6. Mather, P.M. and M.G. Koch. *Computer Processing of Remotely-Sensed Images: An Introduction,* John Wiley & Sons, 2011.
7. Noureldin. A., Karamat, T.B. and Jacques Georgy.*Fundamentals of Inertial Navigation, Satellite-based Positioning and their Integration*, Springer, 2013.
8. Schowengerdt, Robert A. *Remote Sensing: Models and Methods for Image Processing*, Second Edition, Academic Press: San Diego, 2017.
9. Srivastava, G.S. *An Introduction to Geoinformatics*, McGraw Hill Education, India, New Delhi, 2014
10. Wise, S. *GIS Fundamentals*, 2nd Edition, CRC Press, Taylor & Francis Group, 2013.

Pedagogy: The students shall be explained the fundamentals of Remote Sensing, GIS and GPS through audio-visual aid, class discussion, presentations, practical demonstration and field-work. The focus shall be on improving their technical and analytical skills through intensive hand-on training and field work.

SEMESTER-II

DM 201: GLOBAL INITIATIVES FOR DISASTER MANAGEMENT

Max. Marks: 100
Theory Paper: 50
Practical (File Record and Viva Voce: 20+10): 30
Internal Assessment: 20

Objectives: To sensitize students about current global disaster scenario and international initiatives for disaster management. This course also aims at enhancing knowledge of students about global and national organisations that are involved in disaster management.

COURSE CONTENT

Unit-I

Global Disaster Scenario

i. Emergence and evolution of disaster research and management
ii. Global Disasters: Continental disaster profiling
iii. Country-wise disaster profiling with special focus on Asian countries

Unit-II

Global Initiatives for Disaster Management

iv. IDNDR: Formulation, Priorities and Outcomes
v. ISDR: Formulation, Priorities and Outcomes
vi. Hyogo Framework (HFA): Framework, Priorities for Action and outcomes

Unit-III

Contemporary Disaster Management Framework and Future Agenda

vii. Sendai Framework: Goals, objectives and Guiding Principles
viii. Priorities for Action in Sendai Framework
ix. Sendai Framework: Role of Stakeholders; International Cooperation and Partnership

Unit-IV

International Agencies for Disaster Management

x. United Nations: FAO, IOM, UNDP, OHCHR, UNHCR, UNICEF, WFP, WHO
xi. IFRC and ICRC
xii. International Non-governmental agencies

PRACTICAL EXERCISES

1. Analysis of Continental Disaster Frequency, Casualties and Damages
2. Inter-country Disaster Occurrence, Casualties and Impacts in Asia
3. Report on IDNDR, ISDR and HFA
4. Critical Evaluation of Sendai Framework
5. Report on Agencies Involved in Disaster Management at Global Level

Note:

1. A compulsory question containing 10 short answer type questions shall be set covering the whole syllabus. The student shall attempt any 7 questions in about 25-30 words each. Each question shall carry 2 marks (total 14 marks).
2. A total of 8 questions will be set out of the whole syllabus, at least 2 from each unit. The candidates will attempt 4 questions selecting 1 from each unit, carrying 9 marks each (total 36 marks). These will be in addition to the compulsory question at serial number 1.
3. Internal assessment shall be based on Written Test, Snap Test, Participation in Class discussion, Term Paper and Attendance as prescribed by the University.
4. For reappear/improvement candidates(s), who have not been assessed earlier for internal assessment, the marks secured by them in theory paper will be increased proportionally to maximum marks of the paper in lieu of internal assessment. **The paper setter must put note (4) in the question paper.**

5. The candidates will be required to carry out practical exercises and submit the practical file record for evaluation. Assessment of practical record and viva-voce will be done by three examiners consisting of internal, Chairperson of the department and one additional faculty member teaching the course. Distribution of marks: Practical record: 20 marks and Viva-voce Examination: 10 marks. The practical file shall be submitted to the department ten days before the commencement of the theory examination of the semester.

LIST OF READINGS

Essential Readings:

1. Birkmann, J. *Measuring Vulnerability to Natural Hazards: Towards Disaster Resilient Societies*. US: United Nations University Press, 2006.
2. Coppola, Damon P. *Introduction to International Disaster Management*. Third Edition, Elsevier, London, 2015.
3. Elliott, A. and E.V. Hsu (eds.).*The Consequences of Global Disasters*, Routledge, London, 2016.
4. Hewitt, K. *Regions at Risk: A Geographical Introduction to Disasters*, Routledge, 2014.
5. International Federation of Red Cross and Red Crescent Societies (IFRC).*World Disaster Report*, Geneva, Switzerland, 1993.
6. International Federation of Red Cross and Red Crescent Societies (IFRC).*World Disaster Report: Focus on Recovery*, Geneva, Switzerland, 2001.
7. International Federation of Red Cross and Red Crescent Societies (IFRC).*World Disaster Report: Urban Risk*, Geneva, Switzerland, 2010.
8. International Federation of Red Crescent Societies (IFRC).*World Disaster Report: Leaving No One Behind*, Geneva, Switzerland, 2018.
9. Kasperson, J.X., Kasperson, R.E. and Turner, B. L. *Regions at Risk: Comparisons of Threatened Environments*, United Nation, University Press, Tokyo, 1995.
10. The United Nations Office for Disaster Risk Reduction (UNISDR).*Sendai Framework For Disaster risk Reduction: 2015-2030*, Geneva, Switzerland, 2015.
11. www.unisdr.org (Online access to various UNISDR documents and reports)

Further Readings:

1. Alexander, D. E. *Natural Disasters*. London: University College London Press and; Dordrecht and Boston: Kluwer Academic Publishers, 1993.
2. Alexander, D. E. *Confronting Catastrophe: New Perspectives on Natural Disasters*. Harpenden, U.K: Terra Publishing, 2000.
3. Burton, I., Kates, R.W. and White, G.F. *Environment as Hazard*, 2nd edition, Guilford Press, New York, 1993.
4. David Godschalk, Timothy Beatley, Philip Berke, David Brower, Edward J. Kaiser. *Natural Hazard Mitigation: Recasting Disaster Policy and Planning*, Island Press, 1998.
5. Godschalk, D. R., Timothy B., P. Berke, D.J. Brower and E.J. Kaiser. Natural *Hazard Mitigation; Recasting Disaster Policy and Planning*, Washington, D.C. Island Press, 1999.
6. Madu, Christian N and Chu-hua Kuei. *Handbook of Disaster Risk Reduction and Management*. World Scientific Publishing Co. Pvt. Ltd, Singapore, 2018.
7. Montz, Burrell E.; Graham A. Tobin and Ronald R. Hagelman. *Natural Hazards: Explanation and Integration*. Second Edition, The Guilford Press, New York, 2017.
8. UNDP Disaster Management Training Programme. *An Overview of Disaster Management*, 1992.
9. Wisner B, Blaikie P., Cannon T. and I. Davis. *At Risk: Natural Hazards, People's Vulnerability, and Disasters,* 2nd Edition, Routledge, London, 2014.

PEDAGOGY: Students may be encouraged to evaluate world disaster reports to examine the distribution of global disasters and links with levels of development. They will also critically evaluate various global initiatives for disaster management and risk reduction to know the success or shortcoming of such programmes.

DM 202: DISASTER MANAGEMENT MECHANISMS IN INDIA

Max. Marks: 100
Theory Paper: 80
Internal Assessment: 20

Objectives: Main objectives of this course are to familiarize the students with the foundations, recent trends in disaster management in India. It introduces various administrative, institutional and financial framework and Governmental and Non-Governmental practices for disaster management in India.

COURSE CONTENT

Unit I

i. Disaster-scape of India
ii. Role of Planning Commission in Disaster Management
iii. Disaster Management Act, 2005

Unit II

iv. Disaster Management Plan and Policy
v. Institutional Framework for Disaster Management
vi. Financial Framework for Disaster Management
vii. Legal Framework for Disaster Management

Unit III

viii. Role and Responsibilities of NDMA, SDMA, DDMA
ix. Role of NIDM, SIDM, NDRF, SDRF

Unit IV

x. Role of Municipalities and Panchayati Raj Institutions in Disaster Management
xi. Community Participation in Disaster Management and Risk Reduction

Note:

1. A compulsory question containing 15 short answer type questions shall be set covering the whole syllabus. The student shall attempt any 10 questions in about 25-30 words each. Each question shall carry 2 marks (total 20 marks).
2. A total of 8 questions will be set out of the whole syllabus, at least *2* from each unit. The candidates will attempt *4* questions selecting 1 from each unit. These will be in addition to the compulsory question at serial number 1 and each question will carry 15 marks (total 60 marks).
3. Internal assessment shall be based on Written Test, Snap Test, Participation in Class discussion, Term Paper and Attendance as prescribed by the University.
4. For reappear/improvement candidates(s), who have not been assessed earlier for internal assessment, the marks secured by them in theory paper will be increased proportionally to maximum marks of the paper in lieu of internal assessment. **The paper setter must put note (4) in the question paper.**

LIST OF READINGS

Essential Readings:

1. Ahmad, A. *Disaster Management: Through the New Millennium*, Anmol Publications, New Delhi, 2010.
2. Anandha Kumar, K.J., Walia, A. & Chaturvedi, S., (2012).*India Disaster Report 2011*, http://nidm.gov.in/PDF/India%20Disaster%20Report%202011.pdf
3. Collins, L.R.*Disaster Management and Preparedness*, Library of Congress, USA, 2002.
4. Dave, R.K.*Disaster Management in India: Challenges and Strategies*, Prowess Publishing, Chennai, 2018.
5. Government of India. *Disaster Management Act (2005)*, Ministry of Home Affairs, 2005. http://www.ndmindia.nic.in/actsrules/DisasterManagementAct2005.pdf
6. Satendra.*Disaster Management in the Hills*, Concept Publishing House, New Delhi, 2003.
7. Goel, S.L.*Encyclopaedia of Disaster Management*, Deep &Deep Pub., New Delhi, 2006.

8. Gosh, G.K. *Disaster Management*, A.P.H. Publishing Corporation, New Delhi, 2016.
9. Government of India.*Disaster Management in India -A Status Report*, 2004. (http://ndmindia.nic.in/EQProjects/Disaster%20Management%20in%20India%20%20A%20Status%20Report%20-%20August%202004.pdf)
10. Government of India. *Disaster Management in India*, 2005. http://www.unisdr.org/2005/mdgs-drr/national-reports/India-report.pdf
11. Gupta, H.K.*Disaster Management*, Universities Press Private Limited, Hyderabad, 2003.
12. Kumar, R.*E-Governance and Disaster Management*, GenNext Publication, 2018.
13. Singh, S and Singh, J. *Disaster Management*, Pravalika Publications, Allahabad, 2018.
14. United Nations Development Programme.*Disaster Management in India, 2004*. http://www.undp.org/content/dam/india/docs/disaster_management_in_india.pdf

Further Readings:

1. Hewitt, K. *Regions of Risk: A Geographical Introduction to Disasters*, Longman, London, 1997.
2. International Federation of Red Cross and Red Crescent Societies: *World Disasters Reports*.
3. Kapur, A. *Disasters in India: Studies of Grim Reality*, Rawat Publications, Jaipur; 2005.
4. Kasperson, J.X., Kasperson, R.E. and Turner, B. L. *Regions at Risk: Comparisons of Threatened Environments*, United Nation, University Press, Tokyo, 1995.
5. Ministry of Home Affairs, Government of India. *Disaster Management in India, 2011*. http://nidm.gov.in/PDF/DM%20in%20India.pdf
6. National Disaster Management Authority. *National Policy on Disaster Management, 2009*. http://nidm.gov.in/PDF/policies/ndm_policy2009.pdf
7. Paraswamam, S. and Umikrishnan, P.V. *India Disaster Report*, Oxford University Press, New Delhi, 2000.
8. Shastri, K.N. *Disaster Management in India*, 2010, Pinnacle Technology.
9. Singh, R.B.*Disaster Management*, 2000, Rawat Publications, Jaipur.
10. http://nidm.gov.in/ (Online access to guidelines and manuals prepared by NIDM)

Pedagogy: The students shall be explained the foundations, recent trends, governmental practices and mechanisms available for disaster management in India. The focus should be on interactive sessions, group discussions and critical evaluation of disaster management plans and policies.

DM 203: INCIDENT RESPONSE SYSTEM AND EMERGENCY MANAGEMENT

Max. Marks: 100
Theory Paper: 80
Internal Assessment: 20

Objectives: To introduce the idea of developing a systematic response system to manage disasters and emergency situations effectively. This course aims at training students with best practices designed to minimise loss of life and property and to strengthen disaster response mechanism.

COURSE CONTENT

Unit-I

Incident Response System:

i. Concept, Context and Relevance of IRS
ii. IRS Organisation and Features of IRS
iii. Incident Response Teams (IRTs) at State and District Level

Unit-II

Disaster Response Management:

iv. Response and Coordinating Arrangements at National, State and District Level
v. Incident Response System Facilities
vi. Community Participation in Disaster Response

Unit-III

Organisation of Incident Response System:

vii. Incident Commander (IC) and Command Staff
viii. Role and Responsibilities of IC, IMO, LO and SO
ix. General Staff

Unit-IV

Functions of Incident Response System:

i. Operation Section: Role, duties and responsibilities
ii. Planning Section: Role, duties and responsibilities
iii. Logistics Section: Role, duties and responsibilities

Note:

1. A compulsory question containing 15 short answer type questions shall be set covering the whole syllabus. The student shall attempt any 10 questions in about 25-30 words each. Each question shall carry 2 marks (total 20 marks).
2. A total of 8 questions will be set out of the whole syllabus, at least *2* from each unit. The candidates will attempt *4* questions selecting 1 from each unit. These will be in addition to the compulsory question at serial number 1 and each question will carry 15 marks (total 60 marks).
3. Internal assessment shall be based on Written Test, Snap Test, Participation in Class discussion, Term Paper and Attendance as prescribed by the University.
4. For reappear/improvement candidates(s), who have not been assessed earlier for internal assessment, the marks secured by them in theory paper will be increased proportionally to maximum marks of the paper in lieu of internal assessment. **The paper setter must put note (4) in the question paper.**

LIST OF READINGS

Essential Readings:

1. Aitsi-Selmi, A., Egawa, S., Sasaki, H., Wannous, C., & Murray, V. The Sendai framework for disaster risk reduction: Renewing the global commitment to people's resilience, health, and well-being. *International Journal of Disaster Risk Science*, *6*(2), 164-176, 2015.
2. Amri, A., Bird, D. K., Ronan, K., Haynes, K., & Towers, B. Disaster risk reduction education in Indonesia: challenges and recommendations for scaling up. *Natural Hazards and Earth System Sciences*, *2016*, 1-1. 2016
3. Briceño, S. Looking back and beyond Sendai: 25 years of international policy experience on disaster risk reduction. *International Journal of Disaster Risk Science*, *6*(1), 1-7, 2015.
4. Dave, R.K. *Disaster Management in India: Challenges and Strategies*, Prowess Publishing, Chennai, 2018.
5. Government of India. *Disaster Management Act (2005)*, Ministry of Home Affairs, 2005. http://www.ndmindia.nic.in/actsrules/DisasterManagementAct2005.pdf

Further Readings:

1. International Strategy for Disaster Reduction. *Living with risk: A global review of disaster reduction initiatives* (Vol. 1). United Nations Publications, 2004.
2. Kasperson, J.X., Kasperson, R.E. and Turner, B. L. *Regions at Risk: Comparisons of Threatened Environments*, United Nation, University Press, Tokyo, 1995.
3. Ministry of Home Affairs, Government of India.*Disaster Management in India, 2011*. http://nidm.gov.in/PDF/DM%20in%20India.pdf
4. National Disaster Management Authority. *National Policy on Disaster Management, 2009*. http://nidm.gov.in/PDF/policies/ndm_policy2009.pdf
5. http://nidm.gov.in/ (Online access to guidelines and manuals prepared by NIDM)

PEDAGOGY: Students may be encouraged to critically evaluate existing IRS practices in India to identify gaps and shortcoming. Group discussion, interactive learning and hands-on training activities shall be the guiding principles. Students may also be taken to different institutions to acquaint them with procedures and best practices about.

DM 204: DISASTER RISK REDUCTION AND MANAGEMENT PLANNING

Max. Marks: 100
Theory Paper: 50
Practical (File Record and Viva Voce: 20+10): 30
Internal Assessment: 20

Objective: The aim of this course is to sensitise and train students to develop a sound and systematic approach to identify, evaluate and minimise disaster risk. It also intends to train students to conduct community-based disaster risk reduction and management practices in order to prepare society to deal with disasters and reduce socio-economic risks and vulnerabilities.

COURSE CONTENT

Unit-I

Disaster Risk Reduction

i. Disaster Risk: Concept and Components
ii. Disaster Risk Reduction (DRR) Concept and Relevance
iii. DRR Activities and Initiatives; Disaster Risk Management (DRM)

Unit-II

Community Based Disaster Risk Management (CBDRM)

iv. Resilience, Community, Characteristics Disaster Resilient Communities
v. Concept, Need, Relevance and Approaches of CBDRM
vi. Integrating Disaster Risk Reduction with Rural Development

Unit-III

Public Preparedness and Management for Risk Reduction

vii. Public Awareness and Preparedness for Risk Reduction
viii. Mock Drills, School and Hospital Safety, Crowd Management
ix. Developing Disaster Risk Resilience for Urban Cities

Unit-IV

Stakeholders in Disaster Risk Reduction and Management

x. Media in Public Preparedness, Awareness and Risk Reduction
xi. Role of NGOs and Corporate Sector in Disaster Risk Management
xii. Gender-Sensitive Disaster Risk Reduction

PRACTICAL EXCERCISES

1. Conducting Mock Drills for Disaster Safety and Management
2. Conducting Disaster Awareness Programme/Seminar
3. Gender-Sensitive DRR Sensitization Workshops
4. Planning for School Safety Management
5. Planning for Safety of Institutional Buildings during Disasters Emergency
6. Crowd Management and Planning

Note:

1. A compulsory question containing 10 short answer type questions shall be set covering the whole syllabus. The student shall attempt any 7 questions in about 25-30 words each. Each question shall carry 2 marks (total 14 marks).
2. A total of 8 questions will be set out of the whole syllabus, at least 2 from each unit. The candidates will attempt 4 questions selecting 1 from each unit, carrying 9 marks each (total 36 marks). These will be in addition to the compulsory question at serial number 1.
3. Internal assessment shall be based on Written Test, Snap Test, Participation in Class discussion, Term Paper and Attendance as prescribed by the University.
4. For reappear/improvement candidates(s), who have not been assessed earlier for internal assessment, the marks secured by them in theory paper will be increased proportionally to maximum marks of the paper in lieu of internal assessment. **The paper setter must put note (4) in the question paper.**

5. The candidates will be required to carry out practical exercises and submit the practical file record for evaluation. Assessment of practical record and viva-voce will be done by three examiners consisting of internal, Chairperson of the department and one additional faculty member teaching the course. Distribution of marks: Practical record: 20 marks and Viva-voce Examination: 10 marks. The practical file shall be submitted to the department ten days before the commencement of the theory examination of the semester.

LIST OF READINGS

Essential Readings:

1. Abarquez I., Murshed Z. *Field Practitioners' Handbook- Community-based Disaster Risk Management*, Asian Disaster Preparedness Centre, Bangkok, Thailand, 2004.
2. Coppola D.P. *Introduction to International Disaster Management*, 2015, Elsevier, UK.
3. Kelman, I., Mercer, J. and Gillard, J C.*The Routledge Handbook of Hazards and Disaster Risk Reduction Including Climate Change Adaptation*, Routledge, 2017.
4. Madu, Christian N and Chu-hua Kuei. *Handbook of Disaster Risk Reduction and Management*. World Scientific Publishing Co. Pvt. Ltd, Singapore, 2018.
5. UNDP. *Reducing disaster risk: a challenge for development*.(online information is available atwww.undp.org/cpr/disred/documents/publications/rdr/english/rdr_english.pdf)
6. UNISDR (2009) *Terminology on disaster risk reduction*. (online information on various terms used is available at www.unisdr.org/eng/terminology/UNISDR-terminology-2009-eng.pdf)
7. Hyogo Framework for Action Brochure.(www.unisdr.org/eng/hfa/docs/HFA-brochure-English.pdf
8. White, P., Pelling, M., Sen, K., Seddon, D., Russell, S., & Few, R..*Disaster risk reduction: a development concern.* London: DFID, 2005.

Further Readings:

1. Aitsi-Selmi, A., Egawa, S., Sasaki, H., Wannous, C., & Murray, V. The Sendai framework for disaster risk reduction: Renewing the global commitment to people's resilience, health, and well-being. *International Journal of Disaster Risk Science*, *6*(2), 164-176, 2015.
2. Amri, A., Bird, D. K., Ronan, K., Haynes, K., & Towers, B. Disaster risk reduction education in Indonesia: challenges and recommendations for scaling up. *Natural Hazards and Earth System Sciences*, *2016*, 1-1, 2016.
3. Shaw, R (editor). *Community- Based Disaster Risk Reduction*, Emerald Group Publishing Limited, UK, 2012.
4. Wisner, B, JC Gaillard and I. Kelman. *The Routledge Handbook of Hazards and Disaster Risk Reduction*, Routledge, Taylor and Francis Group, Oxon, 2012.
5. UNISDR, Terminology of Disaster Risk Reduction (online information on various terms used in DRR is available at http://www.unisdr.org/eng/library/lib/terminology-eng%20home.htm)
6. WMO, Disaster Risk Reduction Programme (http://www.wmo.int/pages/prog/drr/)
7. UN International Strategy for Disaster Reduction, Geneva(http://www.unisdr.org)

Pedagogy: Students may be encouraged to conduct group-based activities on various aspects of DRR. They may be taken to field to examine and identify vulnerable areas and make report on risk and vulnerability. They will be given hand-on training on various aspects of DRR through mock drills, seminars, workshops etc. designed to disseminate information about disaster risk reduction.

SEMESTER-III

DM 301: RESEARCH METHODOLOGY AND INTERNSHIP REPORT

Max. Marks: 100
Theory Paper: 50
Internship Report: 30
Internal Assessment: 20

Objectives: The aim of this paper is to train the students about the various aspects of scientific investigation, research design, data collection, analysis and interpretation and report writing so that they are in a position to conduct research projects independently and effectively.

COURSE CONTENT

Unit-I

i. Scientific Investigation: Definition, scope and objective, types, approaches and significance.
ii. The research process: the broad problem area; preliminary data collection; problem selection and definition; theoretical framework; hypothesis development and research design
iii. Experimental Design: laboratory experiment; variables; validity; experimental designs

Unit-II

iv. Data collection: measurement, processing and analysis; measurement in research, operational definition, measurement scales, scaling; scaling techniques, reliability and validity; sources of data; data collection methods: interviewing, questionnaires, other methods of data collection; review of statistical data analysis

Unit-III

v. Sampling: Need and purpose of sampling, population and sample, population frame, sampling with and without replacement, population parameters
vi. Sampling theory–sampling distributions, parameter estimation, hypothesis testing. Sampling designs – probability and non-probability sampling

Unit-IV

vii. Report writing: the research proposal, the report, integral parts of the report, steps involved in report writing, types of reports, oral presentation, conclusions

Note

1. A compulsory question containing 10 short answer type questions shall be set covering the whole syllabus. The student shall attempt any 7 questions in about 25-30 words each. Each question shall carry 2 marks (total 14 marks).
2. A total of 8 questions will be set out of the whole syllabus, at least 2 from each unit. The candidates will attempt 4 questions selecting 1 from each unit, carrying 9 marks each (total 36 marks). These will be in addition to the compulsory question at serial number 1.
3. Internal assessment shall be based on Written Test, Snap Test, Participation in Class discussion, Term Paper and Attendance as prescribed by the University.
4. For reappear/improvement candidates(s), who have not been assessed earlier for internal assessment, the marks secured by them in theory paper will be increased proportionally to maximum marks of the paper in lieu of internal assessment. **The paper setter must put note (4) in the question paper.**

INTERNSHIP REPORT

- **Distribution of Marks**:
    a. Evaluation of the Internship Report: 10 marks
    b. Presentation of Data Analysis and Main Findings: 10 marks
    c. Viva-voce: 10 marks
- **Duration of Internship**: 4 Weeks
- **Timing of Internship**: During Summer Vacation following Semester -II Examination
- **Arrangement of Internship:** The Board of Control of Department will plan the task of Internship and coordinate withGovt. Institutes/ Companies, Consultancies, NGOs, Govt. Agency and Other

Agencies, Institutes and Centers in India. Candidates desirous of identifying an agency on their own may submit to the Department a letter stating their intent and a letter of acceptance from the said agency. Those who wish the Department to arrange Internship may express this through a letter to the Chairperson. The Board of Control will consider these applications and make arrangements in the best interest of the students. All those agencies where Internship will be allowed and undertaken will certify the Attendance, Joining and Relieving of the students/candidates.

- **Evaluation of Internship Report:**
  1. Each candidate shall be assigned by the Board of Control to a faculty member for supervision/co-supervision of his/her Internship Report.
  2. The Internship Report shall be prepared by the candidate on the basis of work done or experience gained on visit(s) to Government Agency/Institutes/Centers, NGOs and Other Agencies, Institutes and Centres in India. The candidate shall submit three copies of his/her Internship Report ten days before the commencement of the theory examination of the said semester.
  3. Three examiners shall comprise the Board of Examiners consisting of Supervisor/Co-supervisor, Chairperson of the Department and one more Faculty Member teaching the Course. They shall evaluate the Internship Report independently and the student shall be awarded the mean score of the three evaluations.
  4. The evaluation process shall have three components: (i) Evaluation of the Internship Report, (ii) Presentation of Data Analysis and Main Findings, and (iii) Viva- voce before the Board of Examiners.

LIST OF READINGS

Essential Readings:

1. Creswell, John W., *Research Design; Qualitative, Quantitative and Mixed Methods Approach*, SAGE Publications, Los Angeles, 2008.
2. Flick, U. *An Introduction to Qualitative Research*, 5th Edition, SAGE, 2014.
3. Hillier, F.S. & Hillier, M.S. (2005). *Introduction to Management Science*, Tata McGraw Hill.
4. Kothari, C. R., *Research Methodology, Methods & Techniques,* New Age International Publisher, N. Delhi, 2008.
5. Kumar Ranjit, *Research Methodology: A step-by-step Guide for Beginners*, SAGE Publications, Ltd. London (Third Edition), 2010.
6. Manly, B.F.J. (1994). *Multivariate Statistical Methods. A Primer*. Chapman and Hall, London.
7. Montello, D. and P. Sutton, *An Introduction to Scientific Research Methods in Geography and Environmental Studies*, SAGE, 2012
8. Singleton. R.A. Jr, and Straits B. C. *Approaches to Social Research*. Oxford University Press, New York, 1999.

Further Readings:

1. Bennet P. Lientz and Kathryn P.**,** *Project Management for the 21st Century*, Academic Press, California, 1995.
2. De Vaus, D.A. *Surveys in Social Research*. Allen & Unwin, Sydney, NSW, 1995.
3. Earickson, R., and Harlin, J., *Geographic Measurement & Quantitative Analysis*, Macmillan, New York, 1994.
4. Foddy, W.*Constructing Questions for Interviews and Questionnaires*. Cambridge University Press, Cambridge, 1994.
5. Misra, H. N and V. P. Singh, *Research Methodology in Geography, Social, Spatial and Policy Dimensions*, Rawat Publications, N. Delhi, 1998.
6. Scarbrough E., E. Tanenbaum. *Research Strategies in the Social Sciences*. Oxford University Press. Oxford, 1998.

Pedagogy: The students shall be given an area and problem to apply various aspects of research. The application will expose them about the importance of research and the practical exercises will ignite them to do effective research in future.

DM-302: INDUSTRIAL SAFETY AND RISK MANAGEMENT

Max. Marks: 100
Theory Paper: 50
Practical (File Record and Viva Voce: 20+10): 30
Internal Assessment: 20

Objectives: To train the students to detect, identify and analyze industrial hazards and disasters. The focus of this course is to develop conceptual & theoretical clarity and technical skills in students for analysing various aspects of industrial safety and risk management.

COURSE CONTENT

Unit-I

Introduction to Industrial Safety

i. History and Development of Safety Standards and Codes; Safety Organisations
ii. Accident and their Causes; Accident Prevention and Control Techniques

Unit-II

Work Place Hazards

iii. Identification of Hazards- Physical, Chemical, Electrical and Fire
iv. Industrial Safety Legislations

Unit-III

Industrial Safety Management

v. Concept and Definition, Management Principles
vi. Safety Management Principles and Practices

Unit-IV

Safety Awareness and Training

vii. In-Plant Training Programmes; Out of Plant Training Programme
viii. Role of Trade Unions in Industrial Safety; Safety Promotion and Publicity
ix. Human Behaviour and Safety

PRACTICAL EXERCISES

Practical Exercises based on**:**

1. Measurement of Sound Levels
2. Determination of concentration of inflammable vapours
3. Detection of Carbon-Monoxide, NOx, Hydrogen Sulphide
4. Lung Function Test by Spirometer
5. Measurement of Insulation Resistance, Static Charge (Static Charge Meter)

Note

1. A compulsory question containing 10 short answer type questions shall be set covering the whole syllabus. The student shall attempt any 7 questions in about 25-30 words each. Each question shall carry 2 marks (total 14 marks).
2. A total of 8 questions will be set out of the whole syllabus, at least 2 from each unit. The candidates will attempt 4 questions selecting 1 from each unit, carrying 9 marks each (total 36 marks). These will be in addition to the compulsory question at serial number 1.
3. Internal assessment shall be based on Written Test, Snap Test, Participation in Class discussion, Term Paper and Attendance as prescribed by the University.
4. For reappear/improvement candidates(s), who have not been assessed earlier for internal assessment, the marks secured by them in theory paper will be increased proportionally to maximum marks of the paper in lieu of internal assessment. **The paper setter must put note (4) in the question paper.**
5. The candidates will be required to carry out practical exercises and submit the practical file record for evaluation. Assessment of practical record and viva-voce will be done by three examiners consisting of internal, Chairperson of the department and one additional faculty member teaching the course. Distribution of marks: Practical record: 20 marks and Viva-voce Examination: 10 marks. The practical file shall be submitted to the department ten days before the commencement of the theory examination of the semester.

LIST OF READINGS

Essential Readings:

1. Handbook of Environment Health and Safety: Herman Koren and Michel Bisesi, Jaico Publishing House, Delhi, 1999
2. Handbook of Environment Risk Assessment and Management: Peter Calow, Blackwell Science Ltd. USA, 1998
3. Introduction to Environment Engineering & Science: Gilbert m. M., Pearson Education, Singapore, 2004.
4. Jain, R.K. and Sunil S. Rao, *Industrial Safety, Health and Environment Management Systems,* Khanna Publishers, New Delhi, 2006.
5. Industrial Safety and Pollution Control Handbook: National Safety Council and Associate Publishers Pvt. Ltd, Hyderabad (1993)
6. Slote, L. *Handbook of Occupational Safety and health,* John Willey & Sons, New York
7. Industrial Safety- National Safety Council of India.
8. The Factories Act with Amendments- 1987, Govt. of India Publication, DGFASLI, Mumbai.
9. Grimaldi and Simonds, Safety Management, AITBS Publishers, New Delhi, 2001.
10. Risk Assessment and Environment Management: D. Kofi Asvite-Dualy, John Willy & Sons, West Sussex, England, 1998.

Further Readings:

1. Safety A personal Focus David L Bever.
2. Engineering Chemistry, Jain & Jain.
3. Industrial Management Jain & Bawa.
4. Handbook of Hazardous Air pollutions, Dennis P Nolan P.E.
5. Fire Technology, R.S. Gupta.
6. Major Hazard Control, International Labour Office.
7. Encyclopaedia of occupational health and safety, Inter National Labor Office.
8. Fire service Manual (4 volumes)

Pedagogy: Students may be encouraged to visit a few industries to know about industrial safety and management. Students may be asked to prepare a report on industrial safety based on field observations.

DM-303: URBAN DISASTERS AND RISK MANAGEMENT

Max. Marks: 100
Theory Paper: 50
Practical (File Record and Viva Voce: 20+10): 30
Internal Assessment: 20

Objectives: To train the students to detect, identify and analyze urban hazards and disasters. The focus of this course is to develop conceptual & theoretical clarity and technical skills in students for analysing various aspects of urban disasters and risk management.

COURSE CONTENT

Unit-I

Basic Concepts

i. Urban Hazards and Disasters: Nature and Classification
ii. Urban Hazard and Disasters: Global trends
iii. Urban Hazard and Disasters: Vulnerable Spaces and Sections

Unit-II

Hazard Risk & Vulnerability in Urban Areas

iv. Understanding Hazard Risk and Vulnerability Analysis (HRVA)
v. Preparing Database for HRVA
vi. Conducting /Preparing Hazard Risk Vulnerability Analysis

Unit-III

Disaster Risk Reduction

vii. Risk Sensitive Urban Planning
viii. Resilient Cities and Hazard Proofing of Built Spaces
ix. Implementing Disaster Risk Reduction

Unit-IV

Urban Disaster Management

x. Institutional Arrangements for Disaster Management
xi. Community Based Urban Disaster Management
xii. City Disaster Management Plan

PRACTICAL EXERCISES

1. Interpretation of Data on Urban Disasters
2. Identification of Vulnerable Spaces and Sections in Urban Area
3. Conducting HRVA in Urban Areas
4. Measuring Resilience of Urban Areas
5. Preparing Disaster Plan

Note

1. A compulsory question containing 10 short answer type questions shall be set covering the whole syllabus. The student shall attempt any 7 questions in about 25-30 words each. Each question shall carry 2 marks (total 14 marks).
2. A total of 8 questions will be set out of the whole syllabus, at least 2 from each unit. The candidates will attempt 4 questions selecting 1 from each unit, carrying 9 marks each (total 36 marks). These will be in addition to the compulsory question at serial number 1.
3. Internal assessment shall be based on Written Test, Snap Test, Participation in Class discussion, Term Paper and Attendance as prescribed by the University.
4. For reappear/improvement candidates(s), who have not been assessed earlier for internal assessment, the marks secured by them in theory paper will be increased proportionally to maximum marks of the paper in lieu of internal assessment. **The paper setter must put note (4) in the question paper.**
5. The candidates will be required to carry out practical exercises and submit the practical file record for evaluation. Assessment of practical record and viva-voce will be done by three examiners consisting of internal, Chairperson of the department and one additional faculty member teaching the course. Distribution of marks: Practical record: 20 marks and Viva-voce Examination: 10 marks. The practical file shall be submitted to the department ten days before the commencement of the theory examination of the semester.

LIST OF READINGS

Essential Readings:

1. Baker, J. L. (Ed.). *Climate change, disaster risk, and the urban poor: cities building resilience for a changing world*. The World Bank, 2012.
2. Kelman, I. Relocalising disaster risk reduction for urban resilience. *Proceedings of the Institution of Civil Engineers-Urban Design and Planning*, *161*(4), 197-204, 2008.
3. Sanderson, D., Kayden, J. S., & Leis, J. (Eds.). *Urban disaster resilience: New dimensions from international practice in the built environment*. Routledge, 2016.
4. Shaw, R, Atta-ur-Rehman, A. Surjan and G.A. Parvin, *Urban Disasters and Resilience in Asia, Elsevier Inc*., 2016.
5. Vale, L. J., & Campanella, T. J. *The resilient city: How modern cities recover from disaster*. Oxford University Press, 2005.

Further Readings:

1. Etinay, N., Egbu, C., & Murray, V. Building Urban Resilience for Disaster Risk Management and Disaster Risk Reduction. *Procedia engineering*, *212*, 575-582, 2018.

2. Fekete, A. and Friedrich, F. *Urban Disaster Resilience and Security*. The Urban Book Series, Springer, 2018.
3. Ongkowijoyo, C. S., & Doloi, H. Risk-based Resilience Assessment Model Focusing on Urban Infrastructure System Restoration. *Procedia engineering*, *212*, 1115-1122, 2018.
4. Prior, T., & Roth, F. Disaster, resilience and security in global cities. *Journal of Strategic Security*, *6*(2), 5, 2013.
5. Zhai, G., Li, S., & Chen, J. Reducing urban disaster risk by improving resilience in China from a planning perspective. *Human and Ecological Risk Assessment: An International Journal*, *21*(5), 1206-1217, 2015.

Pedagogy: Students may be encouraged to conduct group-based activities on various aspects of urban risk analysis and management. They may be taken to field to examine and identify vulnerable areas in an urban setting. Students may be asked to prepare a report on risk and vulnerability of different segments of an urban area and develop strategies for risk reduction.

DM-304: GEOINFORMATICS FOR DISASTER MANAGEMENT

Max. Marks: 100
Theory Paper: 50
Practical (File Record and Viva Voce: 20+10): 30
Internal Assessment: 20

Objectives: To train the students to detect, identify and analyze hazards and disasters using geospatial technology. The focus is to develop technical skills among students for analysing various geo-tectonic and hydro-meteorological disasters with the help of remote sensing and GIS technology.

COURSE CONTENT

Unit-I

Geoinformatics Perspective for Disaster Management

i. Significance of Geoinformatics in Disaster Management
ii. Contribution of Geoinformatics to Disaster Management
iii. Satellite Sensors and Data for Disaster Management

Unit-II

Geoinformatics for Disaster Mitigation and Preparedness

iv. Hazard Evaluation: Analysis, Zonation and Modelling
v. Risk and Vulnerability Assessment
vi. Monitoring and Forecasting; Warning and Evacuation

Unit-III

Geoinformatics for Geo-tectonic Hazards and Disasters:

vii. Landslide Hazard Assessment and Monitoring
viii. Seismic Hazard Assessment and Monitoring
ix. Volcanic Hazard Assessment and Monitoring

Unit-IV

Geoinformatics for Hydro-meteorological Hazards and Disasters:

x. Flood Hazard Assessment and Monitoring
xi. Cyclone Hazard Assessment and Monitoring
xii. Drought Hazard Assessment and Monitoring

PRACTICAL EXERCISES

1. Data requirements for various hazards and disasters
2. Preparation of Terrain/Topographical and thematic layers
3. Hazard Auditing and Vulnerability Assessment
4. Landslide Hazard Zonation
5. Seismic Hazard Assessment
6. Volcanic Hazard Assessment

7. Flood Hazard and Risk Analysis
8. Drought Analysis and Mapping

Note:

1. A compulsory question containing 10 short answer type questions shall be set covering the whole syllabus. The student shall attempt any 7 questions in about 25-30 words each. Each question shall carry 2 marks (total 14 marks).
2. A total of 8 questions will be set out of the whole syllabus, at least 2 from each unit. The candidates will attempt 4 questions selecting 1 from each unit, carrying 9 marks each (total 36 marks). These will be in addition to the compulsory question at serial number 1.
3. Internal assessment shall be based on Written Test, Snap Test, Participation in Class discussion, Term Paper and Attendance as prescribed by the University.
4. For reappear/improvement candidates(s), who have not been assessed earlier for internal assessment, the marks secured by them in theory paper will be increased proportionally to maximum marks of the paper in lieu of internal assessment. **The paper setter must put note (4) in the question paper.**
5. The candidates will be required to carry out practical exercises and submit the practical file record for evaluation. Assessment of practical record and viva-voce will be done by three examiners consisting of internal, Chairperson of the department and one additional faculty member teaching the course. Distribution of marks: Practical record: 20 marks and Viva-voce Examination: 10 marks. The practical file shall be submitted to the department ten days before the commencement of the theory examination of the semester.

LIST OF READINGS

Essential Readings:

1. Campbell, J. B. and R.H. Wynne, *Introduction to Remote Sensing* (5th Ed.), Guilford Press, 2012.
2. Hyndman, D. and D. Hyndman, *Natural Hazards and Disasters*, 2nd edition. USA, Belmont: Brooks/Cole, 2009.
3. Oosterom, P. van, Zlatanova,S. and E.M. Fendel*, Geo-information for Disaster Management,* Springer, 2005.
4. Roy, P.S.; Van Westen, C.J.; Jha, V.K.; Lakhera, R.C. and Champati Ray, P.K., *Natural Disaster and their Mitigation: Remote Sensing and Geographical Information System Perspectives*, IIRS, Dehra Dun, Govt. of India, 2000.
5. Tomaszewski, B., *Geographic Information System (GIS) for Disaster Management*, CRC Press, Taylor & Francis Group, Boca Raton, 2015.

Further Readings:

1. Bankoff, G.; Frerks, G. and Hilhorst, D. (2004). Mapping Vulnerability: Disasters, Development and People, Earthscan Publications Ltd.
2. Blaikie, P.; T. Cannon; I. Davis; and B. Wisner (1994). At Risk: Natural Hazards, People's Vulnerability*, and Disasters*, 1st edition, London: Routledge.
3. Pirasteh, S. and Jonathan Li (eds.), Global Changes and Natural Disaster Management: Geo-information Technology, Springer, 2017.
4. Verbyla, David, L., *Satellite Remote Sensing of Natural Resources*, Lewis Publishers, New York, 2005.

Pedagogy: Students will be encouraged to undergo practical problem on various aspects of disaster mitigation, preparedness, warning, forecast and manage disaster with key inputs from geospatial technology. They may be taken to institutions such as IIRS, NRSC and State Remote Sensing Centers to acquaint them with equipment, techniques and their products available for disaster management. Students may be acquainted with the satellite imageries, products, software of various kinds.

SEMESTER-IV

DM 401: DISSERTATION

Marks: 400

1. Formulation of Research Proposal 50 marks 2. Mid Term appraisal 50 marks 3. Pre-submission Presentation 50 marks	**Examination Board** Chairperson Supervisor/Co-supervisor One Faculty Member teaching the course
1. Dissertation Evaluation 150 marks 2. Presentation 50 marks 3. Viva-voce 50 marks	**Examination Board** Chairperson Supervisor/Co-supervisor One Faculty Member teaching the course

- Three copies of the dissertation shall be submitted only on the approval of the Supervisor/s; the signatures of the supervisor/s are mandatory for submission of dissertation.
- A Summary shall be submitted with the dissertation in hard and soft copy. Dissertation to be submitted 3 weeks prior to commencement of University Semester Examination.

Note:

1. **Assigning the Dissertation Title:** Candidates shall submit the titles for dissertation after due consultation with their supervisor/s within 10 days of commencement of academic session
2. **Formulation of Research Proposal:** Candidates are required to give a presentation on research proposal including the research objectives, methodology and the chapter scheme ***three weeks after the assigning of the dissertation title***. The Board of Examiners consisting of the Chairperson of the Department, Supervisor/s and one Faculty Member teaching the course shall evaluate the student independently and student shall be awarded the mean score of the three evaluations.
3. **Mid-term Appraisal:** Mid-term appraisal shall be done by the Board of Examiners ***within a month of formulation of research proposal***. The Board of Examiners consisting of the Chairperson of the Department, Supervisor and one Faculty Member teaching the course shall evaluate the student independently and student shall be awarded the mean score of the three evaluations.
4. **Pre-submission Presentation:** Pre-submission Presentation shall be done by the Board of Examiners ***within a fortnight of the mid-term appraisal***. The Board of Examiners consisting of the Chairperson of the Department, Supervisor and one Faculty Member teaching the course shall evaluate the student independently and student shall be awarded the mean score of the three evaluations.
5. **Evaluation Process:** The evaluation process shall have three components:
   i. Evaluation of dissertation
   ii. Presentation of data analysis and main findings
   iii. Viva voce examination

   Evaluation, Presentation and Viva-voce shall be done by the Board of Examiners consisting of the Chairperson of the Department, Supervisor and one Faculty Member teaching the course. They shall evaluate the dissertation, submitted by the student, independently and student shall be awarded the mean score of the three evaluations. The dissertation shall incorporate the findings arrived at on the basis of the data/information collected from the field and processed, analysed and mapped.
