



आपदा न्यूनीकरण एवं प्रबन्धन उत्कृष्टता केन्द्र, भारतीय प्रौद्योगिकी संस्थान रुड़की,

रुड़की – 247667

CENTRE OF EXCELLENCE IN DISASTER MITIGATION & MANAGEMENT, 3rd Floor,
New Building, Opposite Biotechnology Department

INDIAN INSTITUTE OF TECHNOLOGY ROORKEE, ROORKEE – 247667, UTTARAKHAND, INDIA

Tel: 01332-28-6616 (Office), E-mail: coe_dmm@iitr.ernet.in; www.coedmm.org

1. Subject Code : **DMN-606** Course Title: **Application of Geo-spatial data for Disaster Mitigation**
2. Contact Hours: **L: 3 T: 1 P: 0**
3. Examination Duration (Hrs.) : **Theory: 3 Practical: 0**
4. Relative Weight : **CWS 25 PRS 0 MTE 25 ETE 50 PRE 0**
5. Credits: **4** 6. Semester: **Spring** 7. Subject Area: **PEC** 8. Pre-requisite: **Nil**
9. Objective : To impart knowledge on the use of remote sensing, GIS and GPS tools in various stages of disaster mitigation plans.
10. Details of Course :

| Sl. No. | Particulars | Contact Hours |
|--------------|---|---------------|
| 1. | Meaning and types of disasters: Manmade and natural – earthquakes, volcanoes, landslides, floods, cyclones, tsunamis, anthropogenic, industrial, chemical and environmental, fire etc. Stages of a disaster mitigation plan- pre-disaster planning, disaster preparedness, monitoring phase, emergency response or damage assessment, recovery and relief phase. Role of remote sensing, GIS and GPS in each stage | 5 |
| 2. | Earthquakes: Causative factors, hazard assessment, selection of factors, creation of thematic data layers, preparation of seismic hazard zonation maps, regional risk assessment, GIS modeling for risk mitigation plans; Case studies | 5 |
| 3. | Landslides: Causative factors, hazard assessment, selection of factors – triggering and non-triggering, creation of thematic data layers, preparation of landslide hazard zonation maps, regional and site specific risk assessments, GIS modeling for risk mitigation plans; Case studies | 7 |
| 4. | Cyclones and Flooding: Cyclone: cyclone related parameters and effects on land and sea – damage assessment. Flooding: causes, identification of factors, space-time integration, GIS data layers, flood prone area demarcation, analysis and management, risk assessment; Case studies | 5 |
| 5. | Drought and Desertification: Types of droughts, factors influencing droughts, identification of variables, development of vegetation index, assessment of land use and ground water level changes, delimiting drought prone areas, processes of desertification, over utilization of water and land resources. GIS data layer creation – GIS based management strategies; Case studies. | 5 |
| 6. | Anthropogenic Disasters: Atmospheric Disasters: Ozone layer depletion, green house / global warming – acid rain – snow melt – sea level rise – related problems. GIS data layer creation; Case studies; Marine Disasters: oil spill and chemical pollution, coastal erosion and deposition, factor identification, GIS analysis, management strategies; Case studies. | 5 |
| 7. | Biodiversity Disasters: Ecological degradation – nuclear disaster and biodiversity loss. Identification of parameters (mapping of forest types, protected areas and natural forests) – population extinction – conserving bio-diversity (species and subspecies). Soil erosion, coral / mangrove depletion, forest fire-mining. Remote sensing and GIS analysis for preparation of ecological degradation maps, erosion maps, deforestation maps etc. GIS in environmental modeling; Case studies. | 5 |
| 8. | Differential SAR Interferometry for ground displacement estimations due to earthquakes, landslides, subsidences etc. Validation of displacements through differential GPS surveys | 5 |
| Total | | 42 |

11. Suggested Books :

| Sl. No. | Name of Authors/Book/Publisher | Year of Publication/Reprint |
|---------|--|-----------------------------|
| 1. | Demers, M. N., Fundamentals of Geographic Information Systems, John Willey and sons | 2000 |
| 2. | John A. M., Natural Hazards and Environmental Change, Bill McGuire | 2002 |
| 3. | Skeil A., Environmental Modeling with GIS and Remote sensing, John Willey and Sons | 2002 |
| 4. | Bossler, J.D., Manual of Geospatial Science and Technology, Taylor and Francis | 2001 |
| 5. | Ariyabandu M. and Sahni P.(Eds), Disaster Risk Reduction in South Asia Prentice-Hall | 2003 |