Multi-Hazard Vulnerability and Risk Assessment (Elective)

Code	Credit Hours
DM-816	3 – 0

Course Description:

Aims to provide students with tools and methodologies for conducting multi-hazard risk assessments using GIS and remote sensing. It focuses on evaluating hazards, vulnerabilities, and risk management strategies to enhance disaster preparedness and resilience.

Course Content:

Topics	Learning Outcomes
Introduction to Risk Assessment	Understanding the fundamentals of **disaster risk management (DRM)** and **risk assessment** concepts. Gaining knowledge on **hazard assessment** and the overall process of **multi-hazard risk assessment**.
Obtaining Spatial Data for Risk Assessment	Identifying data requirements for risk assessment, exploring different sources of spatial data, and utilizing data acquisition tools like Google Earth and stereo image interpretation.
Hazard Assessment	Understanding hazard types and the process of hazard frequency-magnitude assessment. Learning how to conduct hazard assessments for multiple hazards including floods, earthquakes, landslides, and volcanic risks.
Elements-at-Risk Assessment	Learning how to define and assess elements at risk, such as infrastructure, buildings, lifelines, and critical facilities. Gaining skills to create an elements-at-risk database.
Vulnerability Assessment	Mastering methods of assessment of vulnerability, including physical vulnerability, social vulnerability, and participatory GIS techniques. Applying spatial multi-criteria evaluation for assessing vulnerability.

Risk Assessment	Exploring both qualitative and quantitative methods for assessing risks, such as HAZUS, QRA, and flood, seismic, and technological risk assessment. Learning to generate risk maps and risk curves.
Risk Management	Evaluating risk governance, understanding risk evaluation methods, and applying cost-benefit analysis to risk reduction strategies. Learning to use risk information for disaster preparedness and spatial planning.
Term Project	Applying knowledge to a final project on multi-hazard risk assessment and risk management

Textbooks:

No textbook for this course. The course will be based on different reference books, reports, and conference and journal publications.

Reference Material:

1. UNISDR's Global Assessment Report on Disaster Risk Reduction (GAR).
2. World Bank’s Multi-Hazard Risk Assessment Guidelines.
3. ILWIS Software Documentation and RiskCity Dataset.
4. Sentinel-1 Remote Sensing Data and Analysis Techniques.Pre-requisite: Preferably students with engineering / science background

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Preferably students with engineering background

Assessment System

Quizzes	15%
Assignments	10%
Mid-Semester Exam	25%
Term Project/Paper	10%
End Semester Exam	40%