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Urban Resilience and Adaptation for India and Mongolia
curricula, capacity, ICT and stakeholder collaboration to support green & blue infrastructure and nature-based solutions

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Revised Course

Remote Sensing, GIS for Disaster Management

~~Remote Sensing, GIS for Emergency Management~~

Semester -I: January – June

Coordinator	Prof P K Joshi
Credits	4 Credits
Lecturers	Prof P K Joshi
Level	M.A.
Host institution	Special Centre for Disaster Research (SCDR), Jawaharlal Nehru University, New Delhi
Course duration	One Semester [January – June]

Summary

This one full semester core course provides the Master level students of Disaster Studies the basic understanding of remote sensing and GIS for disaster ~~emergency~~ *management.. This course focuses on basics of spatial data including remote sensing, GIS database and GPS technology. This course is about procedures to acquire and process satellite remote sensing data, create, collect, analyze and evaluate geospatial data for risk assessment from natural and man-made hazards. The course includes individual assignments.*

Target Student Audiences

Semester - II Students of M.A.

Prerequisites

- Nil

Aims and Objectives

This course has been designed with a view to help students in developing a comprehensive understanding and knowledge on remote sensing and GIS for *disaster* ~~emergency~~ management. This course introduces the principal concepts and techniques of Remote Sensing and GIS, primarily from the perspective of disasters and its aptness for disaster management. It addresses fundamentals and theoretical aspects of interpretation. Course consists of two interrelated parts: a theoretical one that focuses on the concepts to understand disasters footprint as one of Sendai priorities and a practical one that aims at

developing hands-on skills in understanding and displaying risk prone areas using (mostly software) tools.

General Learning Outcomes:

By the end of the course, successful students will:

- Understand the fundamental concept and science of remote sensing and GIS
- Learn the processing of satellite remote sensing data
- Learn spatial data creation and spatial modelling tools
- To know and use sources of remote sensing and GIS datasets,
- Understand importance of geospatial approaches for disaster depiction and understanding

Overview of Sessions and Teaching Methods

The course will make most of interactive and self-reflective methods of teaching and learning including mainly lectures and presentations. It will start with an overview of spatial and temporal data concepts and related terms. Subsequently it will build the science and practice of remote sensing and geospatial data and their integration in geospatial approaches. The sessions will take help of blended teaching and learning approaches for interaction lecturing and hands-on on different course components.

Course Workload

The table below summarizes course workload distribution:

Activities	Learning outcomes	Assessment	Estimated workload (hours)	Self-Study (hours)
In-class activities				
Lectures and Presentations	Introduction to the concepts of spatial and temporal data. Significance of space, location, place and map making	Mid Semester Examination	04	04
Lectures and Presentations	Understanding Disaster and associated risk: Introduction to disasters, impact and mitigation in Global and Indian context; causes and consequences of disaster,—elements of multiple risk mapping, resource mapping, landscape characterizing, assessment, and reduction strategies	Mid Semester Examination	04	04
Lectures and Presentations	Remote Sensing: The electromagnetic radiation principles, spectral reflectance curves, sensors and platforms, multispectral, thermal, microwave, LiDAR, hyperspectral,	Mid Semester Examination	04	04

	image interpretation, specific missions for earth observation, IRS/Landsat series, GEOSS, Geocast, NOAA, long term environmental observation sites and land information system.			
Lectures and Presentations	Digital Image Processing: Rectification, enhancements, classification – unsupervised, supervised, hybrid, accuracy assessment. Biophysical characterization (LST, NDVI, Green/Blue Infrastructure)	Mid Semester Examination	10	10
Lectures and Presentations	Geographic information System and spatial data types: vector and raster representation, topology and spatial relationships, scale and resolution, spatial data entry and preparation, integration of data and map. Global Position System: basic concepts, functions, data collection	End Semester Examination	10	10
Lectures and Presentations	RS & GIS Global and national initiatives for Disaster Risk Management: Disaster management framework of India and recent initiatives by Govt. of India with special emphasis on DRR, Global initiatives (UNISDR, Committee on the Peaceful Uses of Outer Space and etc.), EcoDRR, NBS.	End Semester Examination	04	04
Lectures and Presentations	Disaster Management Support (DMS), Status in India for use of space inputs Mainstreaming DRR in Development, Planning Sustainable development in the context of Sendai framework and SDG's, Disaster Recovery-Strategy	End Semester Examination	04	04
Independent work				
Hands-on exercises	Ability to interpret data, and to use the concepts, tools, and methods for communicating information	Individual Presentations	16	16
Total			**56**	**56**

Grading

The students' performance will be based on the following:

- Quizzes/Surprise Test – 10%
- Mid Semester Examination – 30%
- End Semester Examination – 50%
- Individual Assignments – 10%

Grade	Grade Point	FGPA	Class/Division
A+	9	8.5 and above	High First Class
A	8	7.5 and above but less than 8.5	Middle First Class
A-	7	6.5 and above but less than 7.5	Lower First Class
B+	6	5.5 and above but less than 6.5	High Second Class
B	5	4.5 and above but less than 5.5	Middle Second Class
B-	4	3.5 and above but less than 4.5	Lower Second Class
C+	3		
C	2		
C-	1		
F	0		

Course Schedule: **Semester -I: July – December**

Course Assignments

The Structure of Individual Assignments will be as follows:

- Hands-on exercises using Quantum GIS an SAGA GIS.
- Review of research articles and working paper with given objectives.

Literature

- Jensen, J.R. (2004). Introductory Digital Image Processing: A Remote Sensing Perspective. 3rd Edition, Prentice Hall. ISBN-13: 978-0131453616
- Jensen, J.R. (2006). Remote Sensing of the Environment: An Earth Resource Perspective. 2nd Edition, Pearson Series. ISBN-13: 978-0131889507
- Joseph, G. (2003), Fundamentals of Remote Sensing, Orient Longman Press, Bangalore.
- Kumar P, Geneletti D (2015) How are climate change concerns addressed by spatial plans? An evaluation framework, and an application to Indian cities. Land Use Policy 42: 210–226. doi: 10.1016/j.landusepol.2014.07.016
- Lillesand, T. R. W. Kiefer, J. Chipman (2007) Remote Sensing and Image Interpretation. 6th Edition, Wiley. ISBN-13: 978-0470052457
- Pu, R. (2017). Hyperspectral Remote Sensing: Fundamentals and Practices (Remote Sensing Applications Series). 1st Edition, CRC Press. ISBN-13: 978-1138747173
- Raju E, Becker P (2013). Multi-organisational coordination for disaster recovery: The story of post-tsunami Tamil Nadu, India. Int J Disaster Risk Reduct 4:82–91. doi: 10.1016/j.ijdrr.2013.02.004
- Sabins, F.F., (1996), Remote Sensing: Principles and Interpretation, 3 rd Ed., Freeman & Co., New York.
- Thekkan, A.F., George, A., Prasad, P.R.C., Joseph, S. (2022). Understanding Blue-Green Infrastructure Through Spatial Maps: Contribution of Remote Sensing and GIS Technology. In: Dhyani, S., Basu, M., Santhanam, H., Dasgupta, R. (eds) Blue-Green Infrastructure Across Asian Countries. Springer, Singapore. https://doi.org/10.1007/978-981-16-7128-9_6