Course Type	Course Code	Name of Course	L	T	P	Credit
DE10	MND 409	GEOGRAPHICAL INFORMATION SYSTEM	3	0	0	9

Course Objective

The course will provide a basic knowledge of GIS and engineering applications, followed by an in-depth examination of spatial data formats, spatial data analysis, and geoprocessing.
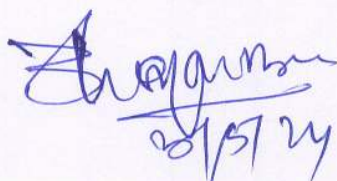
Learning Outcomes

Upon successful completion of this course, students will:

- Demonstrate proficiency in the use of GIS tools to create maps that are fit-for-purpose and effectively convey the information they are intended to.
- Appreciate the potential uses of GIS in Mining
- Develop a strategy to implement an effective GIS
- Geo-referencing and digitization for feature extractions from raster images and updating old maps
- Explore mapped data
- Relate GIS with remote sensing technologies

Unit No.	Topics to be Covered	Lecture Hours	Learning Outcome
1	**Introduction to GIS:** Definition, Concepts and terminology, essential components.	3	An Overview of GIS and its applications
2	*Input Sources to GIS,* data acquisition, Georeferencing of raster data, raster and vector data Models	5	To get knowledge in various input sources to GIS, importance of Georeferencing, Raster and Vector data model
3	Topology and spatial relationships, data storage verification and editing techniques	3	Study on various editing techniques and topological errors.
4	GIS Database construction, database structure, hierarchical data, network systems, relational database	5	To get knowledge on various database structures in GIS environment.
5	Spatial Analysis:data manipulation and analysis. Spatial and mathematical operations in GIS: overlay, query based, buffers, spatial analysis, Symbolization techniques and Various GIS packages and their salient features.	10	In depth knowledge on mathematical operations, symbolization techniques and open source packages in GIS.
7	*Map Projections:* Concept of map projections; Classification of map projections;	4	Need of projection systems, application of various projection systems
8	Types of Map Projections:Conical, Polyconic, Conformal, Mercator and Universal Transverse Mercator projections (UTM), Scale factor	7	Knowledge on various types of map projections.
9	Calculations on projections, State plane coordinates (national grid), Coal grid for mining areas, Transformation of coordinates.	5	Understand the concepts of national grid and coal grid mining areas.

Text Book

1. Burrough, P.A. and Mc Donnel, R.A.(1998), "Principles of Geographic Information System"
2. Kang-tsung Chang. (2002), "Introduction to Geographic Information System