FACULTY OF ENGINEERING & TECHNOLOGY

DEPARTMENT OF CIVIL ENGINEERING

Marwadi University
Marwadi Chandarana Group

Geographic Information System

01CI0623

Objective of the Course:

- To analyze data science and geospatial analytic skills for the investigation of civil engineering problems.
- To base Civil Engineering projects on Geo-Spatial technologies in order to make better decisions.
- To understand modern trend in application of GIS in Civil Engineering domain.
- To apply management techniques in order to maintain project integration management

Credit Earned 04
Student's learning outcomes:

After successful completion of the course, it is expected that students will be able to,

1. Describe the key components and subsystems of GIS.
2. Analyze and differentiate between various spatial data models and manage attribute data with DBMS.
3. Plan and manage a GIS project, including system scope, database design, and quality control.
4. Apply modern GIS techniques for analysis and visualization.
5. Evaluate modern GIS techniques with various tools like ArcGIS/QGIS.

Teaching and Examination Scheme

Teaching Scheme (Hours)			Credits	Theory Marks			Tutorial/ Practical Marks		Total Marks
Theory	Tutorial	Practical		ESE (E)	IA (M)	CSE (I)	Viva (V)	Term Work (TW)	
03	00	02	04	50	30	20	25	25	150

Detailed Syllabus

Sr. No.	Title of the unit	Number of Hours
1	**Introduction**	**6**
	1.1 Introduction, Definitions, Key components,	2
	1.2 GIS- A Knowledge hub, GIS- A Set of Interrelated Sub systems,	2

	1.3 Origin of GIS, Function & Advantages of GIS, Limitation of GIS	2
2	**GIS and Data Science**	**14**
	2.1 Spatial Data Model: Introduction, Spatial & Thematic dimensions of Geographic data, Spatial Entity and Object, Spatial Data models such as Conceptual Data Model, Logical Data Model, Object Oriented Data Models.	4
	2.2 Raster Data Model: Field based Raster Models, Object based Raster Model	4
	2.3 Vector Data Model: Field based Vector Models, Object based Vector Model , Raster Versus Vector data model, File formats for Spatial Data.	3
	2.4 Attribute Data Management: Introduction, Concept of database and DBMS, Advantage and Function of DBMS, Data Models in GIS	3
3	**Planning, Implementation and management of GIS**	**10**
	3.1 Planning of Project: Strategic Purpose, Plan for planning, Understanding of Technological requirements, Defining System scope and designing of database, Analyzing benefit and Costs	3
	3.2 Implementation of Project: Procurement of Hardware and Software, Organization of Project Team, Training & Execution of Project, Quality Control & Checking, Project meeting and reporting	3
	3.3 Management of Project: Schedule Management, Cost management, Quality Management, Contract Scope & Risk Management, Project Integration Managements, Keys for Successful GIS, Reasons for unsuccessful GIS	4
4	**Modern Trends of GIS**	**12**
	4.1 DEM analysis, Analytical modeling in GIS.	4
	4.2 GIS interfaces, GIS post-processing, dynamic visualization, Decision making	4
	4.3 Introduction to ArcGIS / QGIS Desktop GIS - Exploring for spatial and non-spatial data operations, analysis and management.	4
	Total	**42**

List of Activities/ Case Study:

1. Soil Geospatial data mapping and management
2. Land Use/Cover Geospatial data mapping and management
3. Site selection for major infrastructure with geospatial data
4. Natural disaster mitigation with geospatial data

Suggested Theory Distribution

The suggested theory distribution as per Bloom's taxonomy is as per follows. This distribution serves as guidelines for teachers and students to achieve an effective teaching-learning process

Distribution of Theory for course delivery and evaluation					
Remember	Understand	Apply	Analyze	Evaluate	Create
10%	20%	30%	30%	05%	05%

Instructional Method and Pedagogy:

1. At the start of course, the course delivery pattern, prerequisite of the subject will be discussed.
2. Lectures will be taken in class room with the use of multi-media presentations, white board– mix of both.
3. Attendance is compulsory in lectures and laboratory which carries a 5% component of the overall evaluation.
4. Minimum two internal exams will be conducted and average of two will be considered as a part of 15% overall evaluation
5. Assignments based on course content will be given to the students at the end of each unit/topic and will be evaluated at regular interval. It carries a weightage of 5%.
6. Surprise tests/Quizzes will be conducted which carries 5% component of the overall evaluation.

Recommended Study Material

1. Ian Heywood et al., Geographical Information System, Pearson, 2019
2. Bhatta B., Remote Sensing and GIS, Oxford University Press, New Delhi, 2008
3. Lo C.P. and Yeung Albert K.W., Concepts and Techniques of Geographical Information Systems, Prentice-Hall of India Pvt. Ltd. New Delhi, 2006
4. Burrrough P.A and McDonnell R.A., Principles of Geographic Information Systems, Oxford university press, 1998
5. Stan Aronoff, "Geographical Information Systems", WDL Publications, Ottawa, Canada, 1989.