

Course Code	Course Name	Teaching Scheme (Hrs./Week)			Credits Assigned			
		Theory	Practical	Tutorial	Theory	Term Work /Practical	Tutorial	Total
BEITC8043	Geographical Information Systems	04	02	---	04	01	---	05

Course Code	Course Name	Examination Scheme							
		Theory Marks				Term Work	Practical	Oral	Total
		Internal assessment		End Sem. Exam					
		Test 1	Test 2						
BEITL8043	Geographical Information Systems	20	20	80	25	---	25	150	

**Course Objective:**

- To provide an understanding of the basic concepts and uses of GIS technology
- To develop an ability to analyze, interpret geospatial data
- To provide an understanding of the basic principles of Remote Sensing and its use in GIS
- To provide a research platform for students in the area of GIS adapting to ever changing Technologies

**Course Outcomes:**

After completing this course, students will be able to:

- Apply the knowledge of science for real world applications in GIS
- Design and conduct experiments as well as analyze, interpret the geospatial data using GIS tools
- Function with multidisciplinary Teams.
- Use the techniques, skills and modern engineering tools necessary for engineering practice.
- Adapt to Open source standards

**DETAILED SYLLABUS:**

<b>Module No.</b>	<b>Unit No.</b>	<b>Details of Topic</b>	<b>Hrs.</b>
<b>1.0</b>		<b>Fundamentals of GIS</b>	06
	1.1	Introduction, Definition of GIS, Evolution of GIS , components of GIS,	
	1.2	Geospatial Data, Geographic Coordinate System, Map Projections, Commonly Used Map Projections, UTM grid system, Map Scale	
	1.3	Cartographic Symbolization, Types of Maps, Typography, Map Design, Map Production	
<b>2.0</b>		<b>Data Management, Models and Quality Issues</b>	06
	2.1	Vector Model : Topology, Non topological Vector models, Attribute Data in GIS, Attribute Data Entry, Vector Data Query, Manipulation of Fields and Attribute Data	
	2.2	Raster Data Model : Elements of Raster Data Model, Types of Raster Data, Raster Data Structure, Raster Data Query, Data Compression, Data Conversion, Integration of Raster and Vector data	
	2.3	Data input and editing, Data quality Issues: Accuracy, Consistency, Precision and Resolution, Completeness; sources of error in GIS	
<b>3.0</b>		<b>GIS Data Exploration Analysis and Visualization</b>	2+2+4+4=12
	3.1	Data exploration: Descriptive statistics, Graphs, Dynamic Graphics	
	3.2	Vector Data Analysis: Buffering, Overlay, Distance Measurement, Pattern Analysis, Map Manipulation	
	3.3	Raster Data Analysis: Local Operations, Neighborhood Operations, Zonal Operations, Data Extraction, Data Generalization, Comparison of Vector and Raster Based Data	
	3.4	Spatial Interpolation: Elements of Spatial Interpolation, Global methods, Local Methods, Kriging, Comparison of Spatial Interpolation Methods	
<b>4.0</b>		<b>Terrain mapping, Geocoding and Segmentation</b>	04
	4.1	Terrain Mapping and Analysis: Data for Terrain Mapping and Analysis: DIM, TIN, Terrain Mapping, Slope and Aspect, Surface Curvature, Raster versus TIN	
	4.2	Geocoding and Dynamic Segmentation: Geocoding, Applications of Geocoding, Dynamic Segmentation, Applications of Dynamic Segmentation	

<b>5.0</b>		<b>Remote Sensing Fundamentals</b>	12
	5.1	Remote Sensing: Basic Principles, Electromagnetic Remote Sensing, Energy Sources, Energy Interactions with Surface Materials, , Energy Interactions with Earth's Atmosphere, Spectral Reflectance Curves	
	5.2	Microwave Remote Sensing, The Radar Principle, Factors Affecting Microwave Measurements, Radar Wavebands, SLAR Systems, SAR, Interpreting SAR Images, Geometrical Characteristics, Remote Sensing, Platform and Sensors, Satellite System Parameters, Sensor Parameters, Imaging Sensor Systems, Earth Resources Satellites, Meteorological Satellites. Data Formats, Standard Products	
	5.3	Visual Image Interpretation: Information Extraction By human and Computer, Remote sensing Data Products, Image Interpretation, Elements of Image Interpretation	
<b>6.0</b>		<b>Project Management</b>	04
	6.1	Planning of Project , Implementation of Project, Management of Project, Case study	
<b>7.0</b>		<b>Modern trends and Applications of GIS</b>	04
	7.1	Multimedia GIS, Internet GIS, Mobile GIS ,Applications of GIS in Urban and municipal area	

### Recommended Books

1. Kang-tsung Chang, "Introduction to Geographical Information Systems", Tata McGraw Hill, Third Edition, 2003
2. M. Anji Reddi, "Remote Sensing and Geographical Information Systems", B. S. Publications, Second Edition, 2001
3. Basudeb Bhatta ,Remote Sensing and GIS ,Oxford University Press,2<sup>nd</sup> Edition
4. Ian Heywood, Sarah Cornelius & et al., "An Introduction to Geographical Information Systems", 2nd Edition, Pearson Education
5. A.M. Chandra and S.K. Ghosh, Remote Sensing and Geographical Information Systems , Narosa Publishing House Pvt ltd.
6. Peter A Burrough and McDonell, "Principles of Geographical Information Systems", Oxford University Press, 1998.
7. M. N. DeMers, "Fundamentals of Geographic Information Systems", 3rd edition, Wiley.
8. George B Korte, "The GIS Book", Onword press, Thomson Learning, 5th Edition, 2003
9. Tor Bernhardsen, "Geographic Information Systems – An Introduction", 3rd edition, Wiley Publications

**Internal Assessment (IA):**

Two tests must be conducted which should cover at least 80% of the syllabus. The average marks of both the tests will be considered as final IA marks.

**Term Work:**

Term Work shall consist of at least 10 programs based on the above syllabus using any suitable software.

Distribution of marks for term work shall be as follows:

1. Attendance (Theory and Practical): 05 Marks
2. Laboratory work (Performing Experiments and Journal): 20 Marks

The final certification and acceptance of TW ensures the satisfactory performance of laboratory Work and Minimum Passing in the term work.

**Theory Examination:**

- Question paper will comprise of 6 questions, each carrying 20 marks.
- Total 4 questions need to be solved.
- Q.1 will be compulsory, based on entire syllabus where in sub questions of 2 to 3 marks will be asked.
- Remaining question will be randomly selected from all the modules.

Weight age of marks should be proportional to number of hours assigned to each module.