

**Objective of the Course:**

The main objectives of offering this course in second semester of Master of Geotechnical engineering are as following:

1. To impart the fundamentals of GIS, RS & GPS
2. Enable student to read and interpret the GIS images
3. Introduce with the applications of GIS & RS to geotechnical engg

**Credits Earned: 5**

**Students learning outcomes:**

After successful completion of the course it is expected that student will be able to..

1. Read and interpret the GIS/RS data/image
2. Analyse the land use and land cover area through mapping with GPS & GIS

**Teaching and Examination Scheme**

Teaching Scheme (Hours)			Credits	Theory Marks			Tutorial/ Practical Marks		Total Marks
Theory	Tutorial	Practical		ESE (E)	CSE (M)	Internal (I)	Viva (V)	Term Work (TW)	
4	0	2	5	50	30	20	25	25	150

**Detailed Syllabus**

Sr No.	Title of the unit	Number of hours
<b>1</b>	<b>Concepts and fundamentals</b>	
	Energy sources, energy interactions, ideal and real remote sensing systems, fundamentals of air photo interpretation, keys	3
	Elements of air photo interpretation for terrain evaluation	1
	Data acquisition, various remote sensing platforms, satellites, sensors, multi spectral scanners, microwave sensing	3
<b>2</b>	<b>Base data generation</b>	
	Data acquisition, various remote sensing platforms, satellites, sensors, multi spectral scanners, microwave sensing.	4
	Digital image processing, equipment used for remote sensing	2
	Some aspects of interpretation, ground truth.	2
<b>3</b>	<b>Structure of GIS</b>	
	Geographic Data Representation, Storage, Quality and Standards, database management systems	4
	Raster data representation, Vector data representation,	2
	Assessment of data quality, Managing data errors, Geographic data standards.	3
<b>4</b>	<b>GIS Data Processing, Analysis and Modelling</b>	
	Vector based GIS data processing , Queries, Spatial analysis, Descriptive statistics, Spatial autocorrelation, Quadrant counts and nearest neighbor analysis	6
	Raster based GIS data processing, Network analysis, Surface modeling, DTM, GIS Applications: Case studies.	5
<b>5</b>	<b>GPS</b>	
	Basic concepts, components, factors affecting, GPS setup, accessories, segments satellites & receivers,	3
	GPS applications, Case studies	2
	GIS and GPS, Engineering applications, land use/land cover mapping,	2
	Applications to urban and regional planning, Water resources, environmental studies, transportation engineering, other civil engineering fields.	2

**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 effective teaching-learning process

Distribution of Theory for course delivery and evaluation					
Remember 10%	Understand 20%	Apply 20%	Analyze 30%	Evaluate 20%	Create 00%

**Instructional Method and Pedagogy:**

1. Use of Learning Management system like canvas
2. Demonstration through ppt and videos and lectures
3. Brainstorming and group discussion sessions
4. Collaborative learning

**Recommended Study Material:****Reference Book:**

1. Bolstad P. (2005) GIS Fundamentals: A First Text on Geographic Information Systems, Second Edition, White Bear Lake, MN, Eider Press
2. Elangovan K. (2006) GIS: Fundamentals, Applications and Implementations, New India Publishing Agency, New Delhi
3. Longley, P. A., Goodchild, M. F., Maguire, D. J., and Rhind, D. W., Geographic Information Systems and Science, 2<sup>nd</sup> Edition, John Wiley and Sons, 2005.
4. Burrough, P. A., and McDonnell, R. A., Principles of Geographical Information Systems, 2nd Edition, Oxford University Press, 1998

**Web Resources**

1. <https://gis.harvard.edu/training/non-credit-training/virtual-training>
2. <https://www.futurelearn.com> > ... > Maps and the Geospatial Revolution
3. <http://nptel.ac.in/downloads/105102015/>