COURSE DETAILS

- Course conducted by: RSIGST
- Duration of each course: 01 year
- Course certificate: PG Diploma
- Total course hours of each course: 290 hrs
- Course credit: 24
- Class timing: 7.5 Hrs per week
- Course types: Theory & Practical
- Mode of course: Online / Offline
- Total course fees: 35000/-
- Total marks of examination: 600
- Seat Limitations: 15

CERTIFICATE/DIPLOMA/PG DIPLOMA (TITLE): PG Diploma in Geoinformatics

ELIGIBILITY: Graduation in any discipline

DURATION OF COURSE - (in months)- 12 months

COURSE OUTCOME

On completion of the course, students will be able to:

PC1: Develop/Apply: After the completion of course, candidates holding PG Diploma in Geoinformatics have opportunities in terms of career options in various industries, Government and non-Government establishments, teaching, and research.

PC2: Develop/Apply: They can get hired as GIS specialists, GIS Experts, GIS trainee, GIS developer etc.

PC3: Develop/Apply: They will learn about the tools, various aspects and applications of geospatial technology and also how to deal with the industrial projects.

PC4: Develop/Apply: PG Diploma Geoinformatics students can earn good salary packages.

COURSE CONTENT (TITLE) :

Module1: Fundamentals of GIS

Module2: Principles of Cartography

Module 3: Basics of Remote Sensing, Photogrammetry, GNSS & Drone Technology

Module 4: Application of Geoinformatics

Module 5: Application of Python in GIS

Module 6: Dissertation and Project Report

SL.NO	MODULE TITLE	THEORY HOURS	PRACTICAL HOURS (If Applicable)	TOTAL HOURS
Module 1	Fundamentals of GIS	15	30	45
Module 2	Principles of Cartography	15	40	55

Module 3	Basics of Remote Sensing, Photogrammetry, GNSS & Drone Technology	20	30	50
Module 4	Application of Geoinformatics	30	20	50
Module 5	Application of Python in GIS	20	20	40
Module 6	Dissertation and Project Report	10	40	50
TOTAL HOURS- 290 hrs Total theory hours –110 HRS Total Practical Hours- 180 HRS				

1- Fundamentals of GIS	
THEORY (Hours)	
Basics of GIS: Meaning and Scope of Geoinformatics –History and Development of GIS- components of GIS - Data structure - raster and vector- Data input and editing: Encoding methods: Keyboard – Georeferencing - digitization – electronic data transfer-Data editing: Checking and correcting errors in spatial and attribute data GIS Modeling Basics: Visualization Model – TIN – DEM –DTM GIS outputs: Maps as output – Thematic Maps - non-cartographic outputs-GIS and Spatial Decision Support -map as a decision tool	15 Hrs

PRACTICAL (Hours)	
Introduction to software 2. Digital database creation – Point features, Line features, Polygon features 3. Data Editing-Removal of errors – Overshoot & Undershoot, Snapping 4. Data Collection and Integration, Non-spatial data attachment working with tables 5. Geoprocessing techniques: Dissolving, Merging, Clipping, Intersection, Union and Buffering 6. Spatial and Attribute query and Analysis 40 Hrs 7. Contouring and DEM 8. Advanced Analyses – Network analyses 9. Layout and report Generation	30 Hrs
LEARNING OUTCOME	

2 - Principles of Cartography	
THEORY (Hours)	
Maps: Basics: Map - Definition - Need - characteristics - Components and types of maps Principles and History of cartography. Coordinate systems: Distortions in maps: angle-area-distance-direction-shape –geoid-UTM projection system - classification of projections and applications Map database: Spatial database: Survey of India – NRSC - BHUVAN - NATMO – Geological Survey of India - Census of India –National Informatics Centre - Cadastral maps – open street map Physical surveying - GPS and Total Station, Attribute database: Census of India-statistical – National Informatics Centre – India stat – year books station Mapping Techniques: Qualitative mapping technique - Choroschematic and Chorochromatic. Quantitative mapping techniques: Choropleth – Isopleth. Overall map designing: size and shape of maps -- Design of internal map elements: map title, legend, scale, grid, direction, border.	15 Hrs

PRACTICAL (Hours)	
GIS Lab 1. Analysis of Toposheet 2. Updation of maps from Satellite Imagery / change detection 3.Construction of different types of map projection: Conical projection, Cylindrical Projection, WGS 84 4. Preparation of UTM grid 5. Digital mapping	40 Hrs

LEARNING OUTCOME

1.Through this module students can be able to know the basics of cartography, its history of map making, coordinate system, projections for making maps, utilization of different mapping platforms as well as Qualitative mapping techniques and its internal elements.

2. Students can be able to know the fundamental concepts of GIS, GNSS, differentiation of spatial and non-spatial data, Data editing, mapping and map generation, its interpretation and analysis, application of GIS in map making.

3. An ability to design and conduct experiments, as well as to analyze and interpret data.

4. An ability to use the techniques, skills, and modern scientific and technical tools necessary for professional practice.

3 - Basics of Remote Sensing, Photogrammetry, GNSS & Drone Technology	
THEORY (Hours)	
Remote sensing basics: History and development - Electro Magnetic Spectrum - Components and types of remote sensing – Energy interaction with atmosphere and Earth (Rocks, Soil, Water, Vegetation etc.,) - Resolutions (Spectral, Spatial, Temporal & Radiometric) - Platforms – Sensors Aerial photography & Photogrammetry: Historical development - definition - types of aerial photography and uses; Definition, history of photogrammetry - Geometry of vertical aerial photograph, scale of vertical aerial photograph-Digital photogrammetry - use of GPS in photogrammetry Thermal, Microwave & Hyper spectral Remote Sensing: Thermal Remote Sensing: Basic concepts - Thermal sensors & scanners -Microwave Remote Sensing: Basic concepts -RADAR – LiDAR- Basic concepts hyper spectral sensors Satellites, Digital Data & Digital Image Processing: Types of satellites – environmental, resource survey satellites, weather and communication satellites, GPS satellites and Shuttle Mission. Digital Data: Basic Characteristics of digital image - data type and file format. Digital Image Processing: Introduction - stages in digital image processing - Preprocessing: geometric correction, atmospheric correction and radiometric correction. Image Classification: Unsupervised classification - Supervised classification technique Basics of GPS&GPS systems: History of GPS - Advantages and limitations of GPS - Segments of GPS - Control segment - Space segment - User segment; NAVSTAR GPS – GALILEO – GLONAAS – IRNSS GPS surveying: Basic modes of GPS surveying: Differential GPS surveying vs. static GPS surveying. Sources of error GPS applications: ionosphere and atmospheric delays - satellite and receiver clock error,navigational application - vehicle tracking - mobile computing - military application - Precision Farming – Introduction to Drones: Different types of Drones-basic components of Drones. Basic principles of	20 Hrs

flying likeBernoulli's Principle etc.-safety rules while flying drone-DGCA safety regulations- Applications of drones.	
PRACTICAL (Hours)	
1. Introduction to GPS and initial setting 2. Creating codes and attribute table for GPS receiver 3. Point, Line, Polygon Data collection using GPSand area calculation 4. Data downloading from GPS receiver; GPS and GIS integrations output preparation 5. DGPS and Real-Time Kinematic (*RTK*)Post processing of the GPS data 6. Base Map preparation 7. Designing and Symbolization 8. Analog to Digital Conversion (scanning) 9. Analysis of Toposheet 10. Updation of maps from Satellite Imagery / change detection 11. Construction of different types of map projection: Conical projection, Cylindrical Projection, WGS 84 12. Preparation of UTM grid 13. Digital mapping 14. UAV (Drone) Image Processing	30 Hrs
LEARNING OUTCOME 1.Through this module students can be able to know the basics of cartography, its history of map making, coordinate system, projections for making maps, utilization of different mapping platforms as well as Qualitative mapping techniques and its internal elements. 2. Students can be able to know the fundamental concepts of GIS, GNSS, differentiation of spatial and non-spatial data, Data editing, mapping and map generation, its interpretation and analysis, application of GIS in map making. 3. An ability to design and conduct experiments, as well as to analyze and interpret data. 4. An ability to use the techniques, skills, and modern scientific and technical tools necessary for professional practice. 5. An ability to evaluate the utility of cartography, functional basis of a GIS, appreciate the potential uses of GIS and GNSS.	

4 - Application of Geoinformatics	
THEORY (Hours)	
Land Resource: Land use / Land cover – classification – change detection - land use planning: Rural and urban - Land Reclamation –Land Information System - DSS for Land use planning and management Water Resource: Introduction – importance - water pollution – Water Conservation-Command area Program water quality monitoring - surface water harvesting structure - flood prediction Disaster Management: Definition - Classification – Causes - Earthquakes – Landslides - Volcanism – Tsunami Cyclones – Floods - Drought - Forest Fire - Vulnerability – Hazard – Risk Assessment - Natural Disaster Mapping, Management and mitigation using Remote Sensing and GIS.	30 Hrs
PRACTICAL (Hours)	
1. Mapping flood hazards in a region using satellite images 2. Mapping landslide hazards in a region using satellite images 3. Urban sprawl mapping of a township using satellite images 4. Utility-facility mapping for regional development analysis in GIS 5. Application of Geoinformatics for identification of waste disposal sites. 6. Application in Agriculture 7. LanduseLandcover Mapping	20 Hrs

LEARNING OUTCOME

1. Application of Geoinformatics in different verticals is the prime objectives of this module. So through this module students can be able to know how these techniques can be applied in different parameters.
2. Along with this Students can be able to know about Database Management System, Geospatial Modeling.
3. Students will have a greater clarity of basic spatial data concepts and data types.
4. Start analyzing spatial data for your own projects using two powerful freeware tools.
5. Evaluating skills & gain experience by working on a real life conservation related spatial data analysis project.

5 - Application of Python in GIS	
THEORY (Hours)	
Basics of Python: Python, advantages and disadvantages of Python, Interpreter, Features of Python, Python Installation, knowing different IDLE, First Program in Python, Use of Python in GIS, Need of GIS Automation. Syntax and comments, Variables, Data Types, Typecasting, Basic operators and operations, Decision Making and loops, Data Structures & their methods, Lists, Tuples, Sets, Dictionary, Functions, Scope &Modules, Iterators, Decorators and closure in Python, some special functions, Lambda function, Map, Filter, Reduce, Generators Spatial Database Management System: Introduction to Database System: Definition, purpose, data abstraction, instances, schema, DDL, DML, database manager, database administrator, and basic Concepts of entity, relationship and primary key. Postgresql for non-spatial and spatial database Management system. Connection with post GIS and publishing data through QGIS. Database access through DBF Loader. Writing new geometries for inserting in to spatial database. Python in ArcGIS: Introducing Python Using the Python Window in ArcGIS GIS data access and manipulation with Python Reading vector attribute data Accessing data fields Reading through records Retrieving records using an attribute query Retrieving records using a spatial query Writing vector attribute data Updating existing records Inserting new records Working with raster Python for the GIS analysts Reading and parsing text using the Python csv module Writing geometries Automation with	20 Hrs

PRACTICAL (Hours)

1. Introduction to Python 2. Python Data Types 3. Python Program Flow Control 4. Python Functions, Modules And Packages 5. Python String, List and Dictionary Manipulations 6. Python File Operation 7. Python Object Oriented Programming – Oops Concept 8. Python Regular Expression 9. Python Exception Handling 10. Python Database Interaction 11. Python Multithreading 12. Geospatial Analysis using Python 13. Application of Machine Learning and Big Data Analytics using Sci-Py, sk-learn, pandas, tensor flow 14. Relational Database Management System 15. Spatial database creation (Personal Geodatabase, File Geodatabase and Enterprise Geodatabase using spatial database engine, PostgreSQL and PostGIS) 16. Spatial database design using UML, creation spatial database schema 17. Storage of Shape file, spatial data insertion and retrieval, spatial queries using extended SQL , Query optimization & index creation	20 Hrs

LEARNING OUTCOME

1. Learning of computer languages now days is one of the basic needs in all fields. Therefore to make our students strong in application of Python coding language in GIS field and its application in the practical field is one of the major objectives of this module.
2. Build basic programs using fundamental programming constructs like variables, conditional logic,looping, and functions
3. Work with user input to create fun and interactive programs.

Application of python programs in Geospatial field.

batch files Running any tool in the box	

6 - Dissertation & Project Report(50 Hours)	
THEORY (Hours)	
1. Topic Selection and Synopsis writing	10 Hrs
PRACTICAL (Hours)	
2. Data collection and Analysis 3. Report Writing	40 Hrs

LEARNING OUTCOME

1. Preparation of dissertation and a project report helps any students to know the how a project can be handled through the application of GIS-RS technology.
2. Generation, design and evaluation of solutions to practical problems in Geospatial domain.
3. Synthesis of a range of knowledge and techniques.
4. The ability to apply and evaluate appropriate techniques within a variety of paradigms.
5. This portion of the syllabus will help them to do so for their further studies.

Paper Setters
Ankita Das
Somnath Saha
Ayantika Ganguly

Examiners
Ankita Das
Somnath Saha
Ayantika Ganguly

Scrutinizer
Ankita Das
Somnath Saha
Dr. Satiprasad Sahoo

Board of Moderators
Dr. Ranjan Roy
Dr. DK Mandal
Dr. Rakesh Kumar Mandal