

Typical Syllabus for Remote Sensing & GIS**Six months certificate course in Remote Sensing & GIS****Syllabus***ROOTPIXIN Solutions Pvt. Ltd.***Course Overview**

This 24-week (6-month) programme provides comprehensive, hands-on training in Remote Sensing & GIS, progressing from foundational concepts through remote sensing, digital image processing, GIS, cartography, GPS, spatial data infrastructure, photogrammetry, and programming, culminating in an independent capstone project.

Programme-at-a-Glance

Month	Module Focus	Duration
Month 1	Introduction to Geoinformatics & Remote Sensing	Weeks 1–4
Month 2	Digital Image Processing (DIP)	Weeks 5–8
Month 3	Geographic Information Systems (GIS)	Weeks 9–12
Month 4	Cartography, Map Design & Global Positioning System (GPS)	Weeks 13–16
Month 5	Spatial Data Infrastructure, Spatial Analysis & Digital Photogrammetry	Weeks 17–20
Month 6	Programming, Applications & Capstone Project	Weeks 21–24

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Month 1: Introduction to Geoinformatics & Remote Sensing *(Weeks 1–4)*

Objective

Build foundational understanding of geospatial technologies and the principles of remote sensing.

Weekly Breakdown

Week	Topics Covered	Practical / Lab Work
1	Fundamentals of Geoinformatics; overview of geospatial technologies; applications across sectors	Installation & orientation of QGIS/ ArcGIS; exploring open geospatial data portals
2	Principles of Remote Sensing; electromagnetic spectrum and energy interaction	Interpreting false-colour composites; sensor comparison exercise
3	Types of satellite sensors (optical, thermal, microwave/ SAR); spatial, spectral, radiometric & temporal resolution	Downloading and visualizing Landsat/ Sentinel imagery
4	Visual image interpretation elements; introduction to digital image processing workflow	Hands-on visual interpretation exercise; assessment quiz

Month 2: Digital Image Processing (DIP) *(Weeks 5–8)*

Objective

Develop practical proficiency in processing and analyzing satellite imagery for extraction of thematic information.

Weekly Breakdown

Week	Topics Covered	Practical / Lab Work
5	Image pre-processing – radiometric and atmospheric correction; image rectification, geo-referencing and registration	Atmospheric correction and geo-referencing exercise in ERDAS Imagine/ ENVI
6	Image enhancement techniques – contrast stretching, histogram equalization, spatial filtering; image transformation – band ratioing, PCA, vegetation indices (NDVI, SAVI)	NDVI and PCA generation from multispectral imagery

Week	Topics Covered	Practical / Lab Work
7	Image classification – supervised and unsupervised techniques; accuracy assessment and classification validation	Land-cover classification project with confusion-matrix accuracy assessment
8	Feature extraction and pattern recognition; change detection techniques and multi-temporal image analysis	Multi-temporal change-detection lab; mini project submission

Month 3: Geographic Information Systems (GIS) *(Weeks 9–12)*

Objective

Gain end-to-end competence in GIS data handling, spatial analysis, and modeling.

Weekly Breakdown

Week	Topics Covered	Practical / Lab Work
9	GIS principles and components; raster vs vector data models	Building a geodatabase; digitization exercise
10	Data collection and data management; metadata and data quality	Field / attribute data entry and topology cleaning
11	Spatial data analysis and modeling – overlay, buffer, network analysis	Multi-criteria suitability analysis project
12	GIS software and tools; automation basics	Comprehensive GIS project using QGIS/ ArcGIS

Month 4: Cartography, Map Design & Global Positioning System (GPS) *(Weeks 13–16)*

Objective

Master cartographic design principles and GPS-based field data acquisition.

Weekly Breakdown

Week	Topics Covered	Practical / Lab Work
13	Principles of cartography; map composition and design elements	Designing a thematic map layout
14	Map projections and coordinate systems	Reprojecting datasets and evaluating distortion

Week	Topics Covered	Practical / Lab Work
15	Thematic mapping techniques (choropleth, isopleth, dot-density)	Producing thematic maps for a case-study region
16	GPS principles and applications; GPS data collection and processing	Field GPS survey and post-processing exercise

Month 5: Spatial Data Infrastructure, Spatial Analysis & Digital Photogrammetry *(Weeks 17–20)*

Objective

Understand data-sharing frameworks, advanced spatial modeling, and photogrammetric techniques.

Weekly Breakdown

Week	Topics Covered	Practical / Lab Work
17	SDI concepts and components; standards and metadata; web & cloud-based GIS	Publishing a web map service (WMS/WFS)
18	Raster and vector spatial analysis; terrain analysis (slope, aspect, hillshade)	DEM-based terrain analysis lab
19	Land use / land cover change detection modeling	LULC change-modeling project
20	Digital photogrammetry – aerial photography concepts, photogrammetric principles, photographic scale; creation of DEM / DTM	Generating DEM / DTM from stereo-pair / drone imagery

Month 6: Programming, Applications & Capstone Project *(Weeks 21–24)*

Objective

Apply programming skills to automate geospatial workflows and complete an independent capstone project.

Weekly Breakdown

Week	Topics Covered	Practical / Lab Work
21	Introduction to GIS programming (Python/R); geospatial libraries and automation basics	Scripting a batch raster-processing workflow

Week	Topics Covered	Practical / Lab Work
22	Applications of Geoinformatics – environmental management, urban planning, disaster management, agriculture & forestry	Sector-based case-study analysis
23	Capstone project planning; literature review and methodology design	Project proposal submission and mentor review
24	Project execution, fieldwork / case study, and final dissertation report	Final project presentation and viva-voce

Tools & Software

- QGIS/Surfer 3D / ArcGIS/ERDAS Imagine/ENVI
- QGIS Semi-Automatic Classification Plugin
- Python Handheld / GPS receivers / Mobile receivers
- USGS EarthExplorer
- Copernicus Open Access Hub

Assessment & Certification

- Weekly practical assignments and lab exercises
- Monthly module tests / quizzes
- Small-projects at the end of DIP and GIS modules

A Certificate of Completion in Remote Sensing & GIS will be awarded by ROOTPIXIN Solutions Pvt. Ltd. to candidates who achieve a minimum aggregate of 50% across all assessment components and complete the capstone project.

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