



Gis Vision India®
ISO 9001:2015 Certified Organization

1 Month GIS Development Training Course.

Training Syllabus GVI®

Table of Contents

1. Introduction to Geographic Information Systems (GIS)

- What is GIS?
- Definition & Relevance: Understanding GIS and its transformative impact across fields like urban planning, agriculture, disaster management, health, and environmental science.
- Evolution of GIS Technology: From paper maps to cloud-based, AI-integrated GIS.
- Core Components of GIS: Hardware, software, data, people, methods.
- Popular GIS Software
- GIS Data Types: Spatial vs. non-spatial; vector, raster, and tabular data.
- Coordinate Systems & Projections: WGS84, UTM, EPSG codes and re-projection.
- Data Models: Vector (point, line, polygon), Raster (grids, pixels).

2. Data Acquisition & Sources

- Types of GIS Data: Topographic maps, satellite imagery, GPS data, drone data, IoT sensors.
- Data Collection Techniques:
 - Field surveys (DGPS/RTK)
 - Digitization and scanning
 - UAV-based data collection
- Authoritative Data Sources:
 - Survey of India, NRSC-Bhuvan, USGS Earth Explorer, Copernicus Open Access Hub, OpenStreetMap, Indian State GIS Portals

3. Georeferencing & Map Alignment

- Understanding Georeferencing
- Setting Coordinate Systems
- Adding Ground Control Points (GCPs)
- Image Rectification & Accuracy Assessment
- Use Cases: Aligning scanned maps or drone imagery.

4. Spatial Data Digitization

- Concept of Digitization
- Creating Shapefiles & Geodatabases
- Vectorization Techniques: Points, lines, polygons
- Shapefile Structure & Extensions
- Editing Tools & Topological Rules
- Building and Managing Attribute Tables
- AutoCAD to GIS Conversion: Layers, polyline extraction, coordinate correction

5. Map Design & Layout Elements

- Map Layout Best Practices
- Components:
 - Title, North Arrow, Scale, Legend
 - Grid Lines & Coordinates
 - Labels, Annotations, and Insets
 - Borders & Boundaries
 - Data Sources, Copyrights & Metadata
- Cartographic Principles: Clarity, hierarchy, symbology, balance.

6. Thematic Mapping Techniques

- Choropleth & Graduated Symbol Maps
- Dot Density Maps
- Isopleth and Contour Maps
- Flow & Network Maps
- 3D Thematic Maps (Terrain, Population)
- Heat Maps & Kernel Density Maps
- Time-Series Animation Maps (e.g., change detection)

7. GIS Spatial Analysis

- Buffering & Proximity Analysis
- Overlay Operations: Intersect, Union, Identity
- Spatial Join and Relationship Mapping
- Clipping, Erasing & Merging
- Dissolve, Aggregate, and Summarize
- Hotspot & Spatial Pattern Analysis
- Zonal Statistics & Terrain Modelling
- Network Analysis: Shortest path, service area, accessibility modelling

8. Data Transformation & Integration

- Vector-Raster Interconversion
- Coordinate System Transformation (Reprojection)
- Data Merging, Splitting & Aggregation
- Excel to GIS (XY Data Import)
- GPS Data Conversion & Correction (GPX, KML, CSV)
- AutoCAD File Integration
- Using GeoJSON & Web Services (WFS/WMS)

- Metadata Creation and Standards
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9. Fundamentals of Remote Sensing

- What is Remote Sensing & How It Works
 - Electromagnetic Spectrum & Spectral Signatures
 - Types of Remote Sensing: Active (Radar/LiDAR) vs Passive (Optical)
 - Platforms:
 - Satellite: Landsat, Sentinel, IRS
 - Aerial: UAV/Drones
 - Ground-based sensors
 - Sensor Resolutions: Spatial, Spectral, Temporal, Radiometric
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10. Remote Sensing Data Processing

- Understanding Bands/Channels
 - Digital Elevation Models (DEM, DSM, DTM)
 - Ortho-rectification & Mosaicking
 - Cloud-based Processing Platforms: Google Earth Engine, Sentinel Hub
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11. Image Interpretation & Classification

- Visual Interpretation Elements: Tone, shape, size, pattern, texture
 - Supervised vs. Unsupervised Classification
 - Image Enhancement Techniques: Contrast stretching, filtering
 - Accuracy Assessment & Confusion Matrix
 - Object-Based Image Analysis (OBIA)
 - Time-Series and Change Detection Analysis
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12. Remote Sensing Applications (Multi-sectorial Focus) as per requirement

- Urban & Infrastructure Planning
- Agriculture: Crop monitoring, NDVI, yield prediction
- Forestry: Tree canopy, biomass estimation
- Water Resources: Watershed delineation, flood risk mapping
- Environmental Monitoring: Pollution, degradation, deforestation
- Disaster Management: Floods, landslides, wildfire mapping
- Public Health: Disease spread mapping, heat risk zones
- Land Use & Land Cover Mapping
- Geology & Mineral Exploration
- Archaeological Site Detection

- Climate Change & Carbon Stock Analysis
 - Smart Cities & Sustainable Development Goals (SDG) Monitoring
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13. Emerging Trends in GIS & Remote Sensing

- Integration with Artificial Intelligence & Machine Learning
- Cloud GIS & Real-time GIS
- Drone-based Mapping & 3D Modelling
- Geospatial IoT
- Big Data & Spatial Data Science
- Open-source GIS Tools & APIs
- BIM & GIS Integration