# Course Syllabus

3 Months Advanced Geoinformatics Training

Gis Vision India

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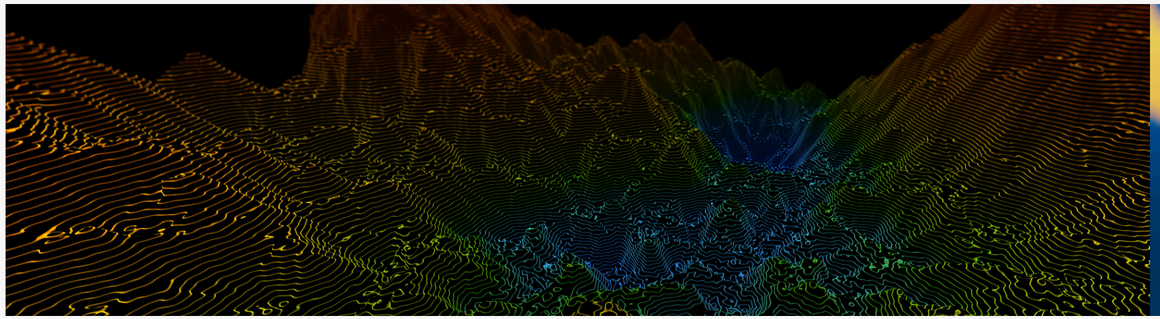
**Master GIS, Remote Sensing, and Spatial Analytics.**

# Course Overview




## Academic & Delivery Information

- Course Title: Geoinformatics
- Course Duration: 3 Month (2 month training +1 month project internship)
- Mode of Delivery: Live 1:1 Online Class
- Prerequisites: None

## Learner Profile & Technology Stack

Target Audience (Students, Working Professionals, Civil Engineers, Government Officials, Planners, etc.)

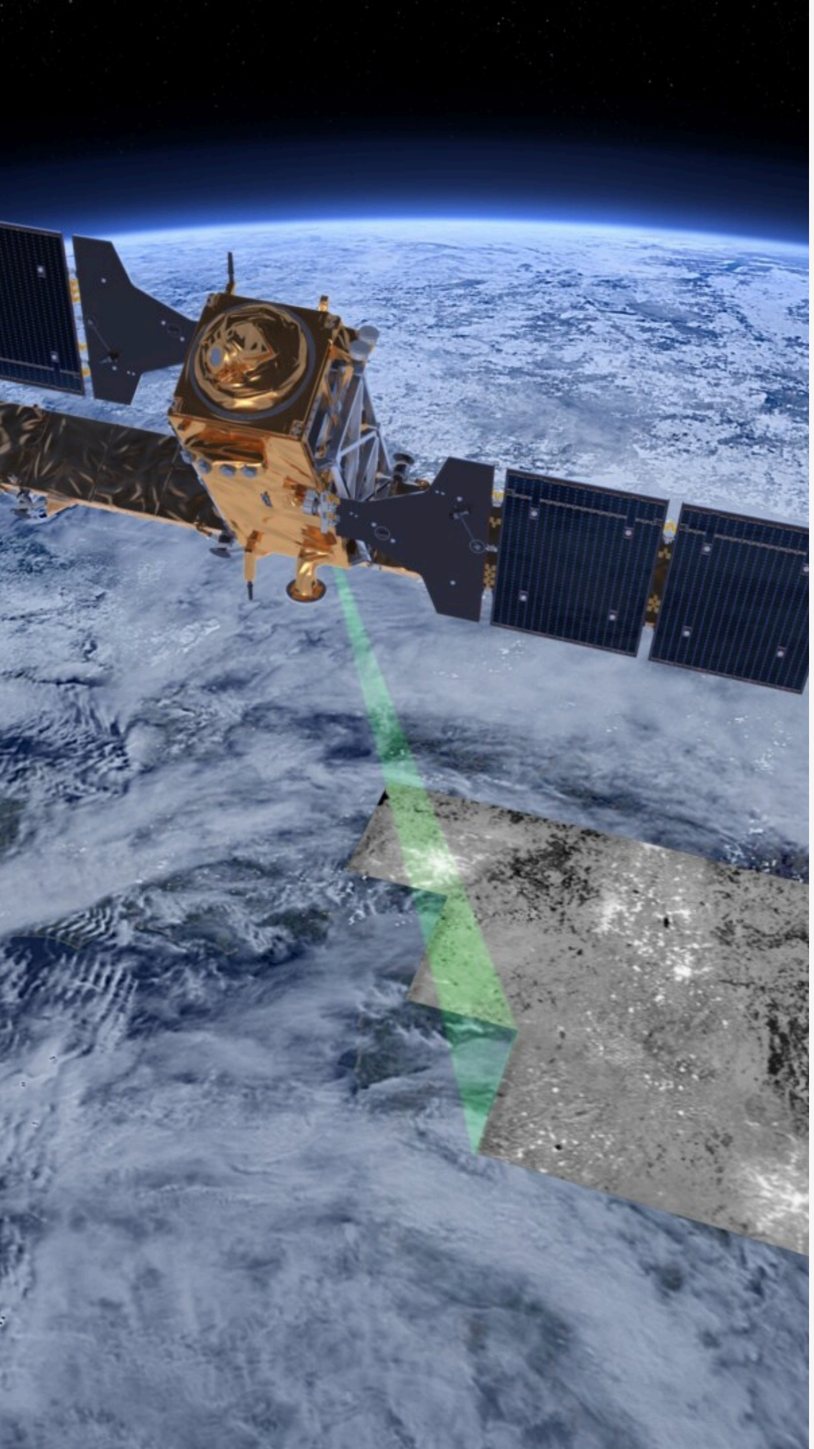
# Learn GIS that actually gets you hired.

## Don’t just learn maps—learn how decisions are made.

Supports beginners while also helping professionals upskill with structured learning

## GIS is not software, it’s a career skill.

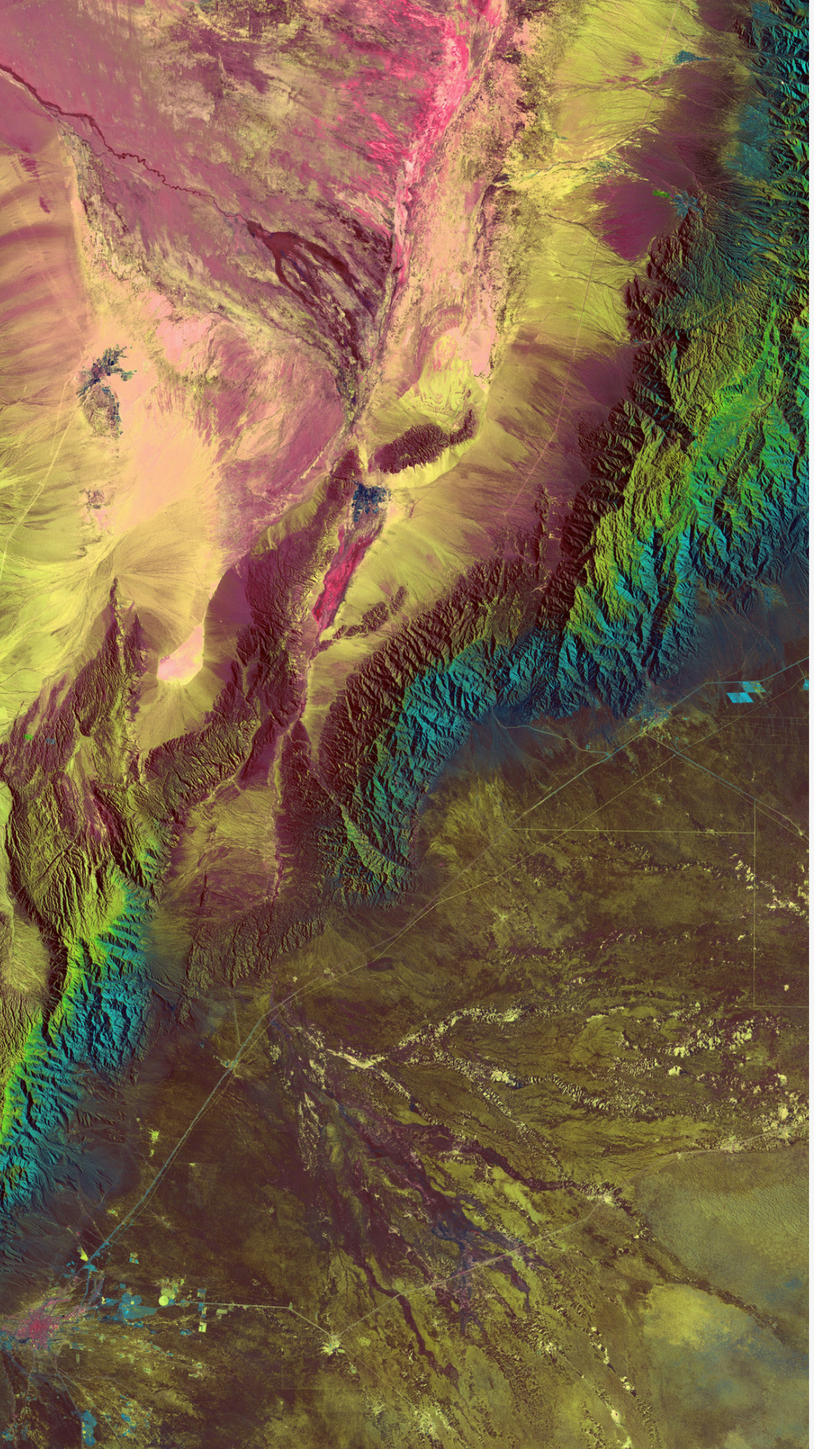
Helps learners understand long-term career pathways beyond just tool usage





## Topic 1:Geospatial Fundamentals & Spatial Data Framework

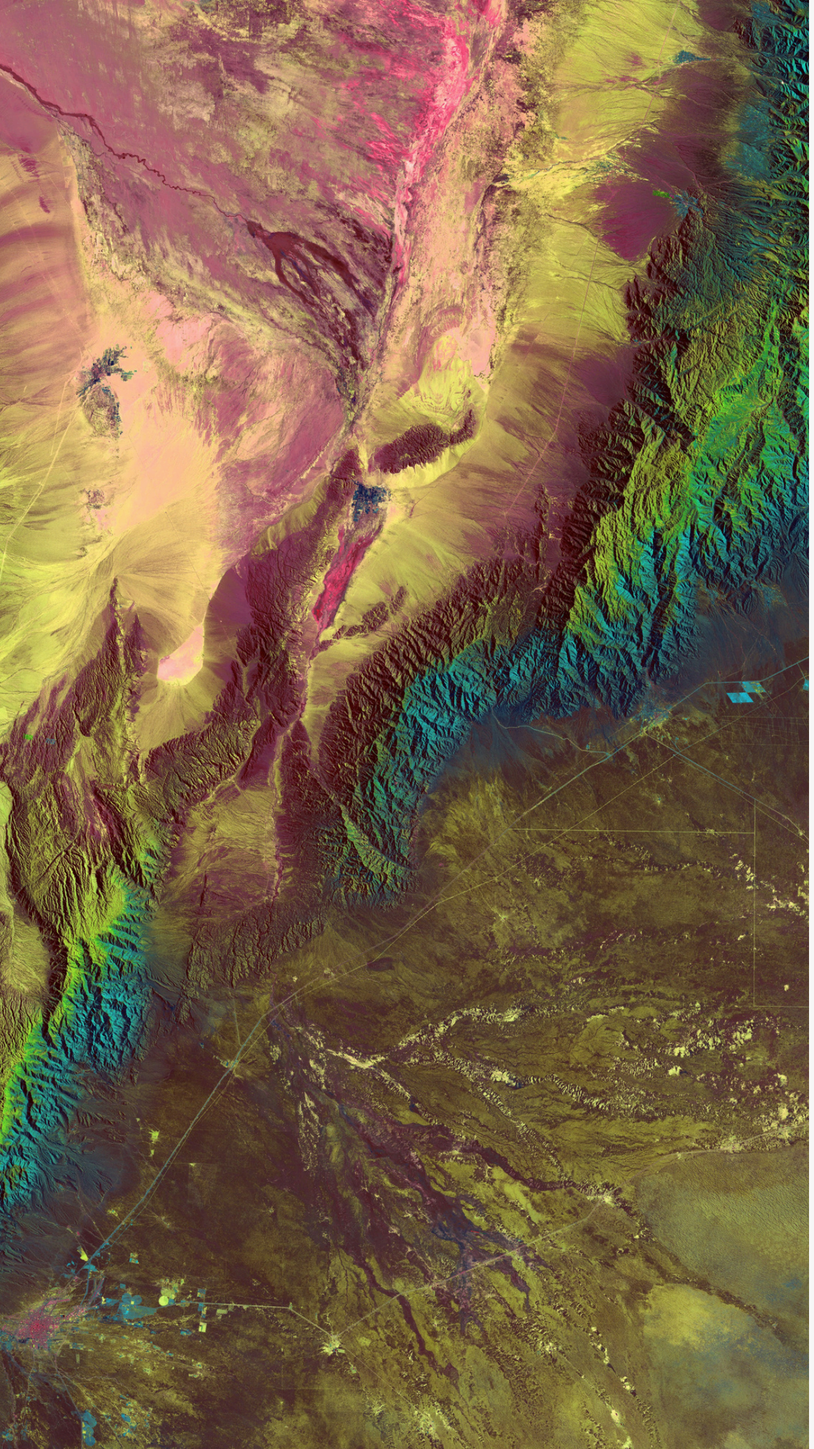
- What is GIS ?
- Spatial vs non-spatial data and real-world applications
- Vector data models: points, lines, polygons and topology
- Raster data models: pixels, grids and continuous surfaces
- Attributes, relational tables and joins
- Spatial relationships: adjacency, containment, connectivity, proximity
- Coordinate Reference Systems (CRS): geographic vs projected
- Datums and ellipsoids; EPSG codes and WGS84 reference
- Map scales, scale factor and distortion types
- GIS software ecosystem overview, specialized tools
- Geospatial file formats: Shapefile, GeoPackage, GeoTIFF, KMZ/KML
- Basics of spatial database concepts





## Topic 2: Vector Data Management, Topology & Geoprocessing

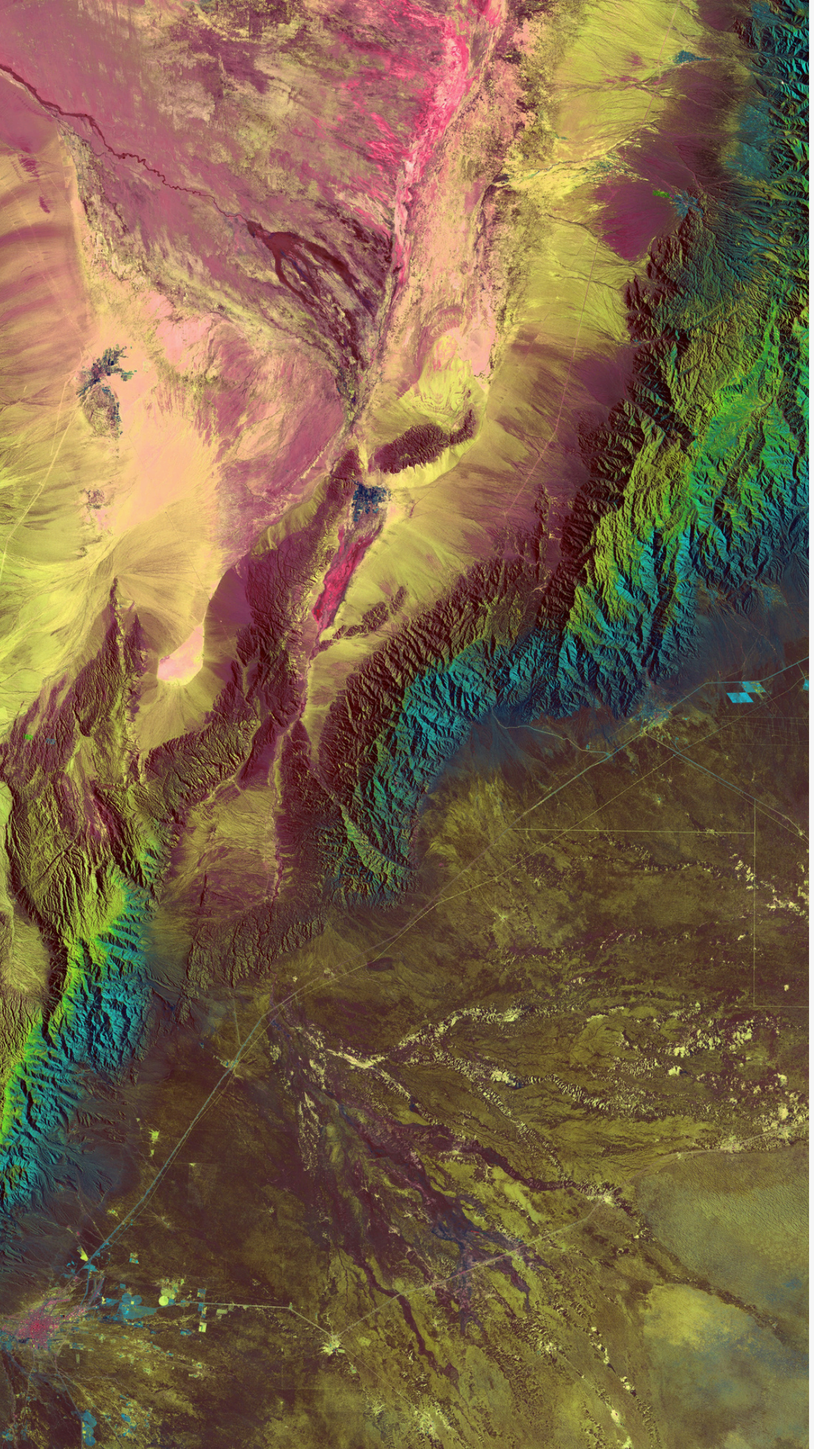
- Attribute table management: joins, relates, field calculator
- Digitization workflows: snapping, topology rules, vertex editing
- Topology validation and feature integrity checks
- Advanced selection: attribute and spatial queries (GUI & SQL)
- Geoprocessing toolbox: buffer, clip, intersect, union, dissolve, erase
- Spatial overlay operations and topological integrity
- Geometry cleanup and feature validation
- Positional and attribute accuracy, error propagation
- Symbology and visual representation of vector data
- Preparing datasets for export: Shapefile vs GeoPackage
- Industry workflow best practices for vector data





## Topic 3: Vector Analysis & Spatial Statistics

- Topology validation and correction
- Spatial overlay analysis: intersect, union, clip
- Proximity analysis & nearest neighbor
- Network concepts: service area and accessibility
- Attribute joins & relates
- Field calculations & derived attributes
- Point pattern analysis and hotspot detection
- Cadastre and parcel data handling
- Geoprocessing automation using ModelBuilder/Graphical Modeler
- Quality control and data validation





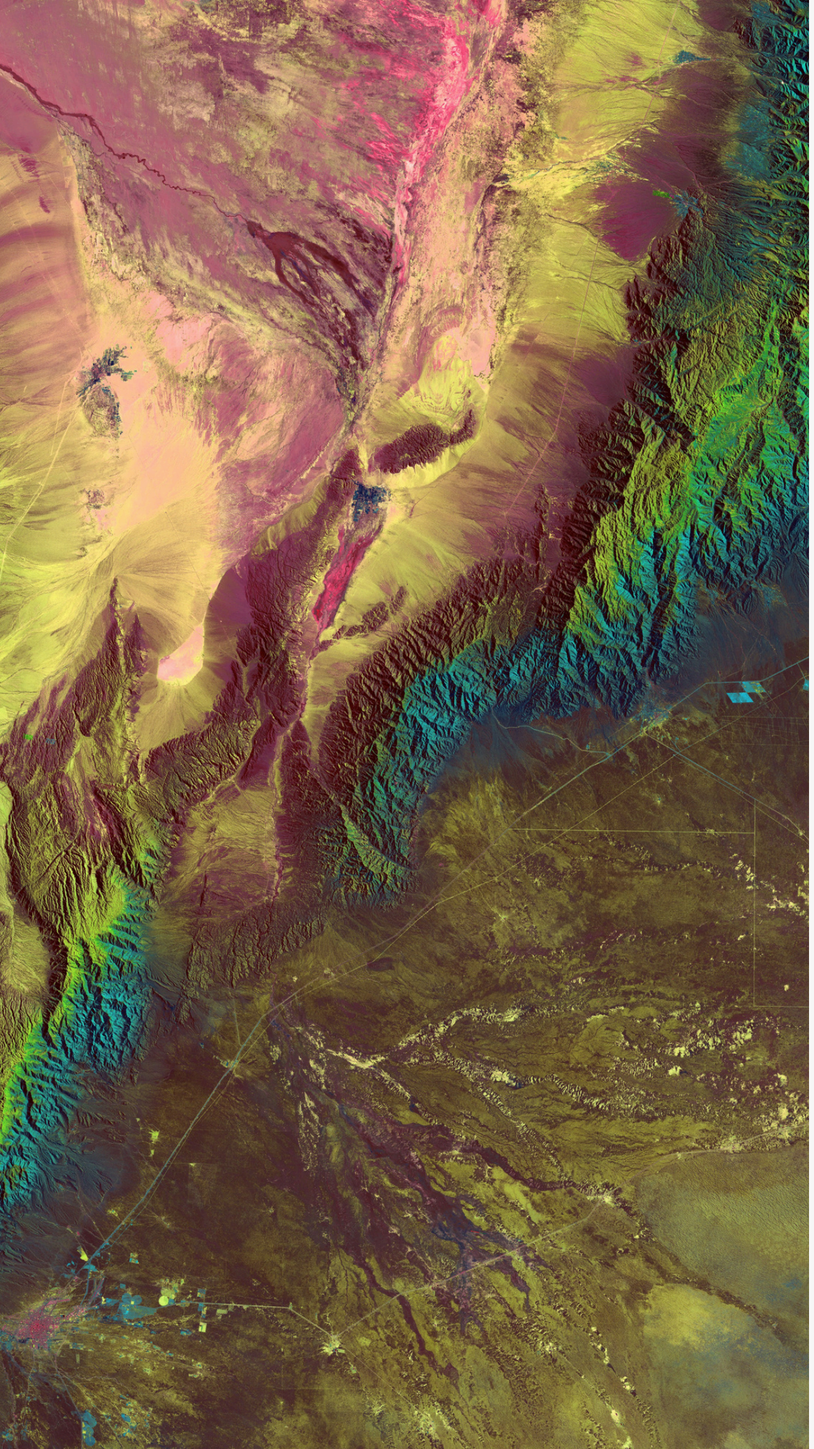
## Topic 4: Spatial Databases & Data Management

- Enterprise GIS data workflows
- GeoPackage, SpatiaLite, File Geodatabase, PostGIS
- Multi-user editing, versioning, scalability
- Spatial indexing and performance optimization
- Basic spatial SQL: SELECT, WHERE, ST_Intersects
- Data lineage and governance
- Backup and archival strategies
- Synchronization between offline/online data
- Attribute validation & error checking
- Import/export workflows in enterprise GIS



## Topic 5: Satellite Imagery Types & Earth Observation Systems

- Raster structure: pixels, bands, data types
- Spatial, spectral, temporal and radiometric resolution
- Common satellite sensors: optical (multispectral), thermal, SAR
- Satellite datasets: Landsat, Sentinel-2, MODIS
- Radiometric and geometric corrections: orthorectification, calibration
- Image pan-sharpening and spectral enhancement
- Band combinations: true color, false color composites
- Raster operations: reclassification, resampling, mosaicking, clipping
- Working with multiband imagery
- Vegetation indices: NDVI, NDWI, interpretation
- Raster metadata and provenance





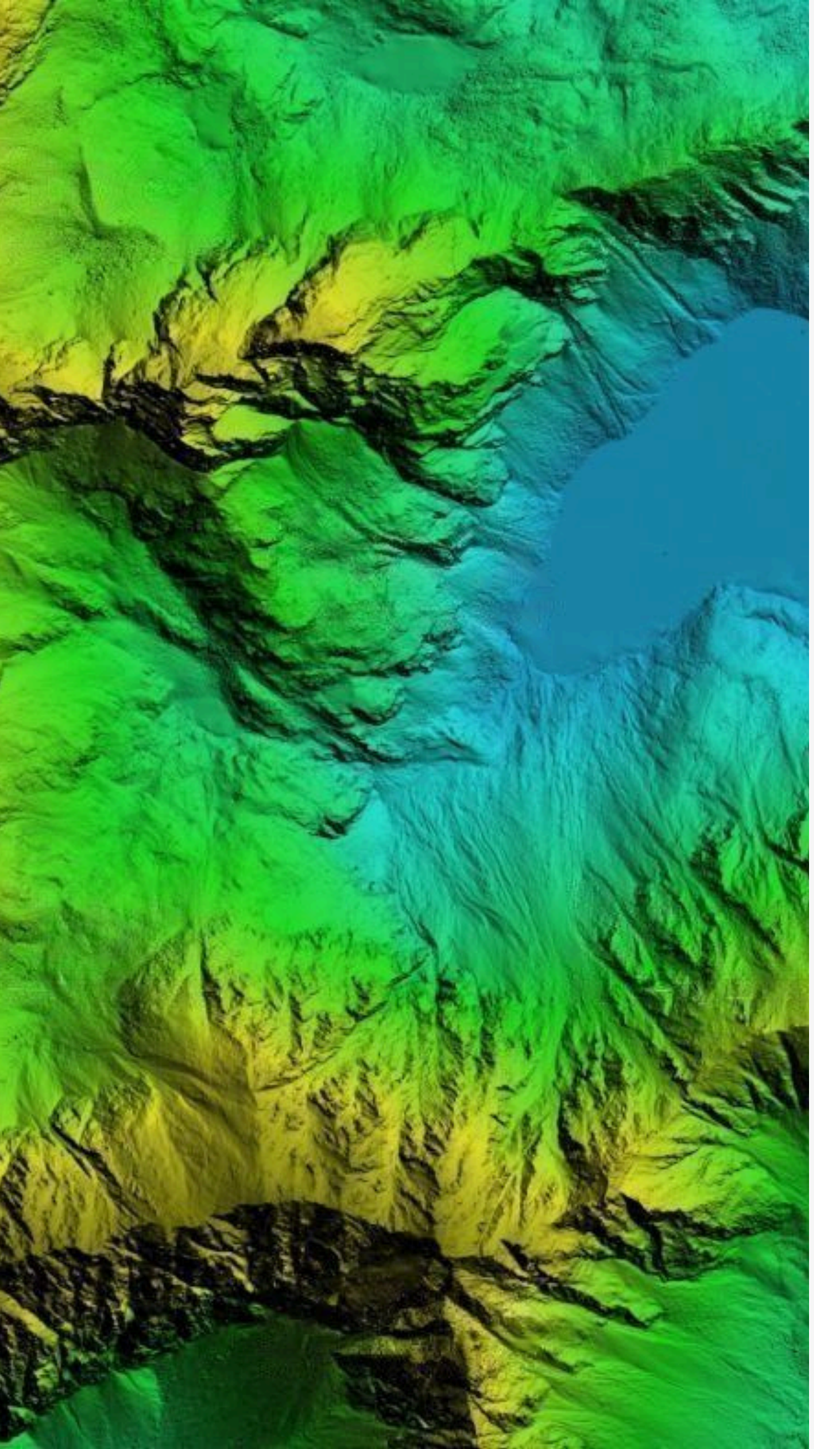
## Topic 6: Terrain Derivatives & Surface Morphometry

- Digital Elevation Models (SRTM, ALOS) & vertical datum considerations
- DEM preprocessing: void filling, smoothing, edge correction
- Terrain derivatives: slope, aspect, hillshade
- Topographic indices: TRI, TPI
- Contour generation and cartographic smoothing
- Hydrological preprocessing: fill sinks, flow direction, accumulation
- Watershed & stream network delineation
- DEM applications in various sectors
- Cut/fill analysis and line-of-sight assessment
- Accuracy, scale and resolution considerations
- Creating visual terrain outputs in GIS



## Topic 7:Multispectral Satellite Image Classification and Post-Processing Techniques

- Visual image interpretation: tone, texture, pattern, association
- Supervised classification workflow: training samples, signatures
- Unsupervised classification: K-means, ISODATA
- Post-classification cleanup and refinement
- Accuracy assessment: confusion matrix, producer/user accuracy, overall accuracy, kappa
- Change detection: image differencing, post-classification comparison
- Cloud masking and seasonal effect considerations
- Thematic mapping from classified rasters
- Raster-to-vector conversion for LULC
- Integrating classification outputs with GIS layers





## Topic 8: GNSS & Field Data Capture (Surveying workflows)

- GNSS fundamentals: satellite constellations, signals, Position Dilution of Precision(PDOP)
- Receiver types: mapping grade vs survey grade
- RTK/PPK concepts and differential corrections
- GNSS accuracy and error sources
- Mobile data collection: Survey123, Collector, QField
- Field metadata and attribute schemas
- Data validation and QA/QC procedures
- Importing field data into desktop GIS
- Coordinate transformation & CRS alignment
- Field data integration with existing GIS datasets



## Topic 9: Applied Cartography: Visual Hierarchy, Accessibility & Multi-Page Map Production

- Map design principles: hierarchy, contrast, balance, typography, color theory for maps.
- Layout composition: scale bar, north arrow, legends, inset maps, neatlines.
- Symbolization best practices for different data types.
- Production workflows: export to PDF, high-res printing, multi-page mapbooks.
- Map standards & metadata inclusion (ISO/FGDC basics).
- Accessibility & color ramp palettes.
- Produce a professional A3 map layout with print settings and export.
- Assignment: Create a map series (2–3 thematic maps) for a chosen study area.

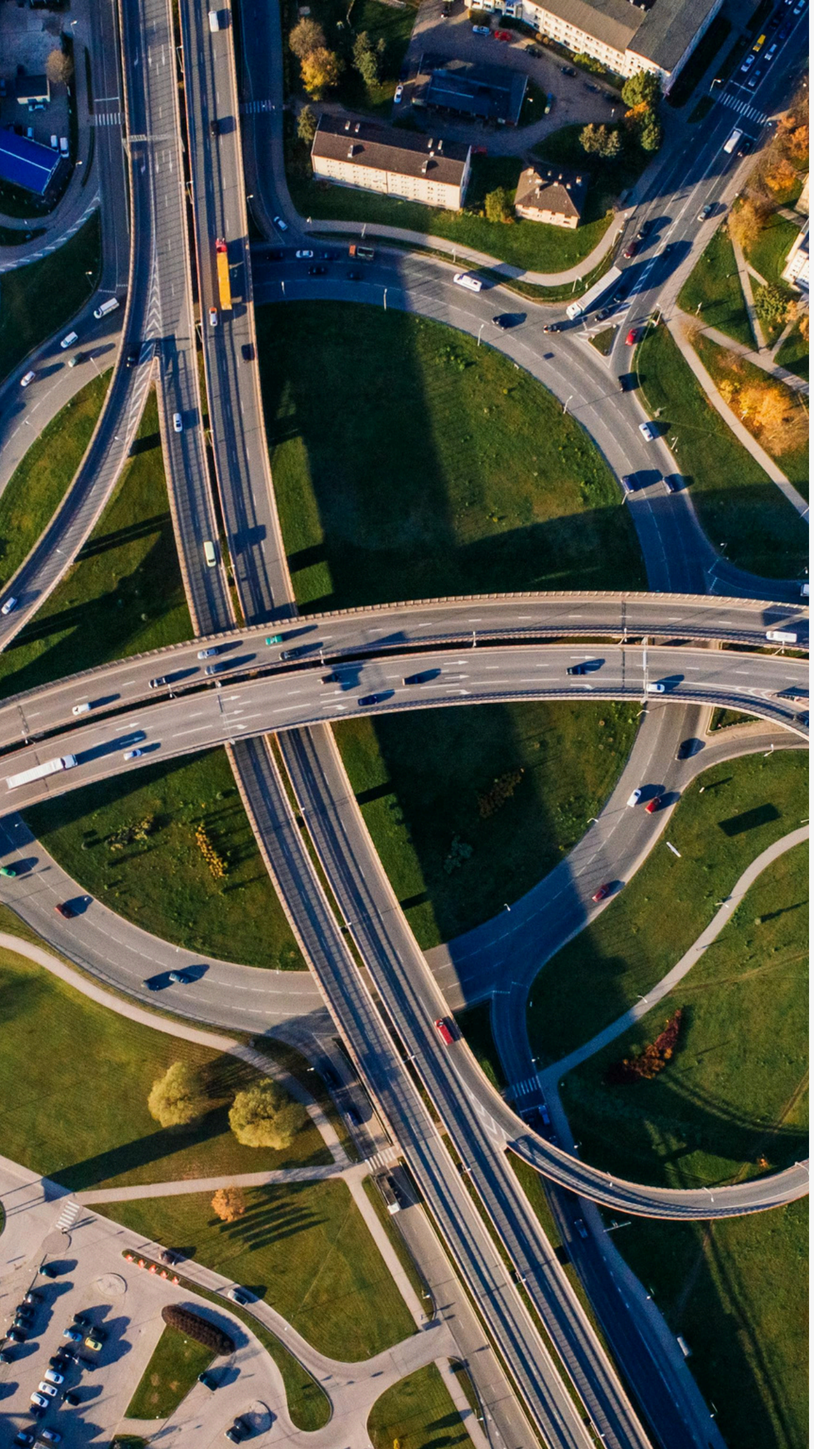
## Topic 10: Advanced Earth Observation Sensors: SAR, Thermal Remote Sensing & Multisensor Data Integration

- SAR fundamentals (conceptual): backscatter, speckle and common applications (mapping flood, terrain).
- Thermal imagery uses: urban heat islands, thermal mapping basics.
- Image quality control: identifying artifacts, cloud/shadow masking best practices.
- Multisensor fusion concepts (optical + DEM + SAR) — workflow examples.
- Basic thermal and SAR visualization (using sample datasets / GUI tools).
- Assignment: Short report comparing optical vs SAR use cases for disaster monitoring.



## Topic 11: LiDAR fundamentals & point cloud overview

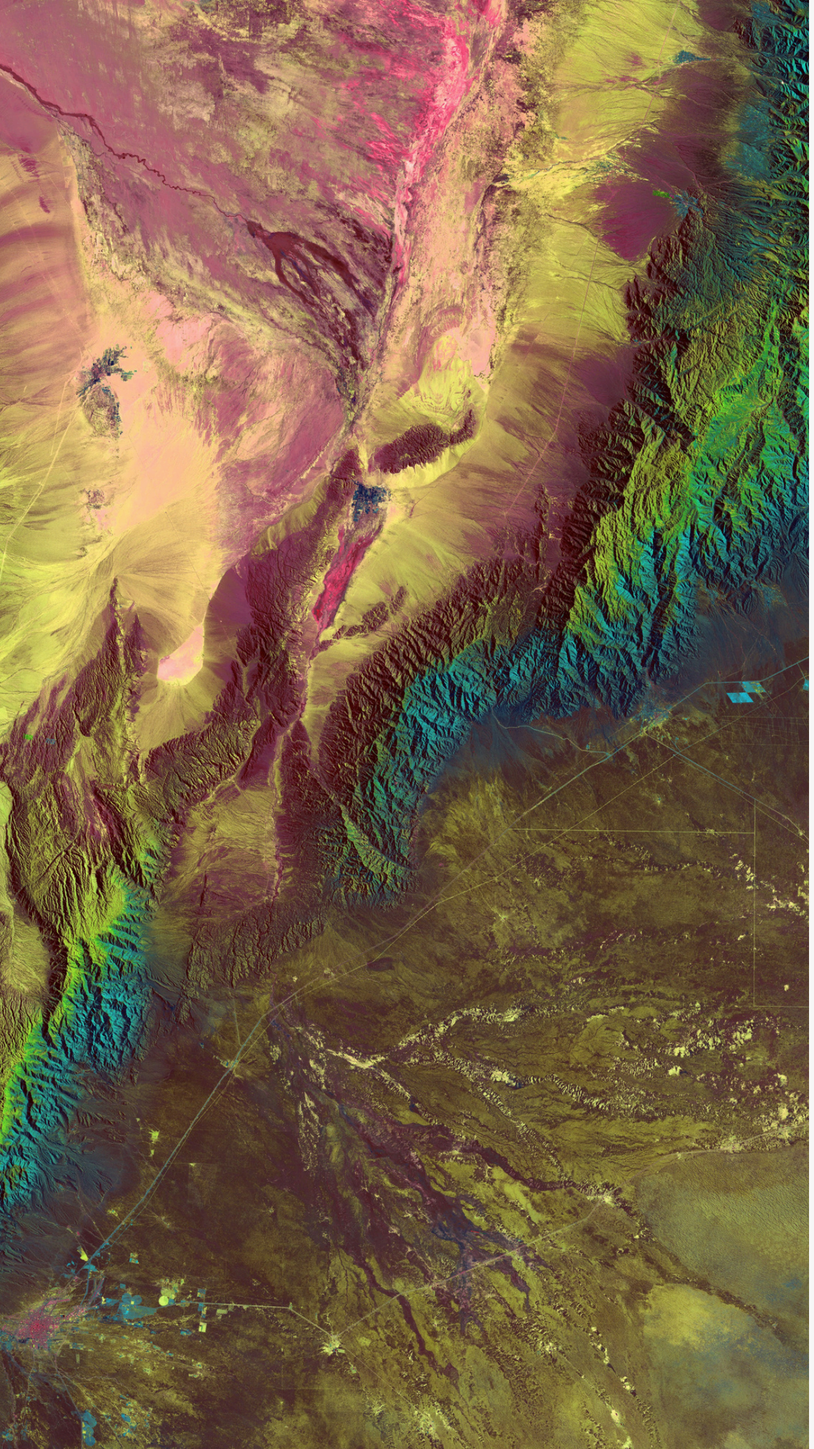
- LiDAR basics: point density, returns, RGB/Intensity, LAS/LAZ formats.
- Point cloud processing concept: classification (ground, vegetation, buildings), DEM/DTM generation.
- Use cases: corridor mapping, utilities, forestry structure, urban 3D modelling.
- Tools overview: LAStools, PDAL concepts (GUI explanation).
- Extracting features: building footprints, tree height estimation (conceptual).
- Assignment: Visualize a sample LAS/LAZ, produce a simple elevation model and hillshade.





## Topic 12: UAV / Drone data workflows

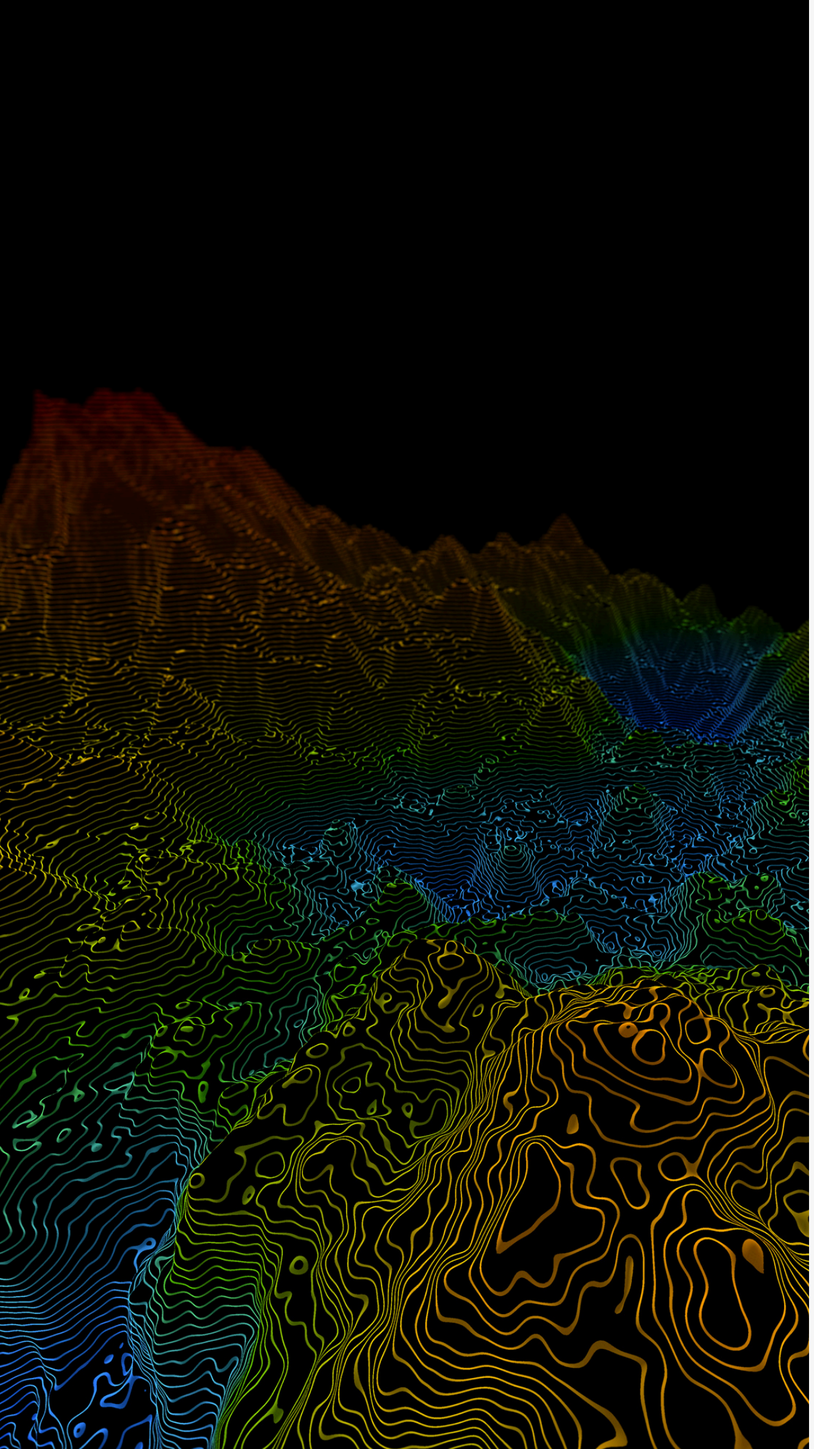
- UAV platforms overview (fixed wing vs multirotor), payloads, GSD planning basics.
- Flight planning considerations: overlap, GSD, ground control points (GCPs) and their role in georeferencing.
- From images to orthomosaic & DSM: photogrammetry pipeline (conceptual).
- QA/QC of orthomosaics and integrating into GIS (vector extraction, change detection).
- Safety, permissions and regulatory basics (local compliance concept).
- Assignment: Inspect a UAV orthomosaic; digitize sample assets.





## Topic 13: Integrated GIS–MCDA Framework for Suitability and Site Selection Analysis

- Introduction to spatial decision support systems (SDSS) and multi-criteria decision analysis (MCDA) in GIS
- Concept of suitability analysis and application areas
- Multi-criteria evaluation (MCE) workflow in GIS
- Analytic Hierarchy Process (AHP): principles, pairwise comparison
- Defining criteria and sub-criteria for suitability
- Standardization and weighting of raster/vector criteria layers
- Pairwise comparison matrix creation and deriving weights
- Weighted overlay analysis in ArcGIS Pro & QGIS (GUI-based workflows)
- Validation & sensitivity analysis of suitability maps
- Exporting and presenting results: maps, reports, and decision support outputs





## Topic 14: Network Topology, Impedance Modelling & Accessibility Mapping in GIS

- Definition of spatial networks and graph theory concepts (nodes, edges, impedance)
- Real-world applications: transportation, utilities, logistics, emergency services
- Geometric networks vs network datasets
- Linear referencing systems (LRS) overview
- Edge connectivity, junctions, turns, and connectivity rules
- Shortest Path & Route Optimization
- Service Area Analysis
- Closest Facility Analysis
- Location–Allocation Analysis




## Topic 15: Capstone project, presentation & career readiness

- Capstone project work  that includes: data sourcing, processing, analysis, map products and a short web map.
- Project documentation & metadata checklist for handover.
- Portfolio building: what to include (maps, story, data, role, tools used) — sample phrases with industry keywords for CVs.
- Interview prep: common GIS analyst tasks, sample technical questions.
- Final assessment: project presentation, submission of map products and data package.

# Course Objectives

## Objective 1:Learn the Language of Location

Build a solid foundation in GIS concepts and spatial thinking to understand, create, and interpret geospatial data confidently.

## Objective 2:  Turn Data into Decisions

Apply spatial analysis, mapping, and visualization techniques to solve real-world problems using industry-standard GIS tools.

## Objective 3: Become Industry-Ready

Gain hands-on project experience, practical workflows, and professional exposure aligned with current geospatial industry demands.

# Why This GIS Course Stands Apart ?

## Built for Industry

What the industry uses is what you learn

## Tools That Employers Expect

Train on tools trusted by professionals

## Mentorship from Working Professionals 10+ years of Experience

Learn from people who apply GIS every day.

## Limited Batches for Better Attention

“Quality over quantity—always.”
**Over 95% of course duration are dedicated to hands-on labs and real datasets**

# Course Policies

## Enrollment Policy

- Enrolment is confirmed only after successful registration and fee payment.
- Seats are limited and allotted on a first-come, first-served basis.
- Course access credentials will be shared prior to the commencement date

## Attendance Policy

- A minimum of 75% attendance is required to be eligible for course completion certification.
- Missed sessions may be compensated through recorded content.

## Certification Policy

- Meeting minimum attendance requirements
- Successful completion of assessments and project

# Course Policies

## Code of Conduct

- Learners are expected to maintain professional behaviour during sessions and interactions.
- Any form of misconduct, plagiarism, or misuse of training materials may lead to termination of course access without refund.
- Respectful communication with instructors and peers is mandatory.

## Recording & Content Usage Policy

- Course materials, recordings, datasets, and documentation are proprietary.
- Redistribution, recording, or commercial use of training content is strictly prohibited without written permission.

## Refund & Cancellation Policy

- Fees once paid are non-refundable and non-transferable.
- Course rescheduling or cancellation by the organisation will be communicated in advance, with suitable alternatives offered.

# Technical Requirements Policy

- Learners must ensure access to a compatible computer, stable internet connection, and basic technical readiness.
- Technical support will be limited to course-related software guidance only.
- Any significant requiremwnt will be communicated in advance.

# Contact Us

## Scan the QR code for the Admission

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## Email Address

info@gisvisionindia.com

## Consultation Hours

2 PM to 4 PM, Monday to Friday