

Basic of GIS and QGIS Training Curriculum

Basics of GIS

- GIS stands for Geographic Information System, used to manage and analyze spatial (location-based) data.
- Integrates maps, data, and analysis tools for better decision-making.
- Main components: Hardware, Software, Data, People, and Methods.
- Works with two data types: Vector (points, lines, polygons) and Raster (grids, imagery).
- Attributes (non-spatial features) describe spatial features (e.g., name, type, population).
- Uses Coordinate Systems and Projections to accurately locate data on Earth.
- Performs spatial analysis like buffering, overlay, and querying.
- Data collected from GPS, Remote Sensing, Surveys, and Open Data sources.
- Key outputs: Maps, Reports, Dashboards, and Visual Insights.
- Widely applied in urban planning, agriculture, environment, disaster management, and navigation.
- Nowadays, GIS technology is being utilized across almost every sector, empowering organizations with location-based insights for smarter decision-making.

QGIS Practical Applications

Introduction & QGIS Foundations

- Introduction to GIS & QGIS interface and Coordinate Reference System (CRS)
- Understand GIS basics, QGIS interface, and spatial data handling.
- It's Installation and information about its advanced versions

- Explore with menus, toolbars, panels, the status bar, and the map canvas
- Learning all above toolbars in detail
- Working with Spatial Data: Loading shapefiles, raster, styling, attributes
- Map Navigation & Project Management: Layer order, grouping, bookmarks, project saving
- Hands-On: Explore QGIS, style, symbology and features categorization in QGIS

Geospatial & Attribute Data Creation and it's Editing

- Creation of shapefiles for point, line and polygon features
- Digitization: Create/edit features, snapping and saving the edits
- Use of snapping tool while digitization.
- Learning of advance editing features including reshape, split polygon
- Importing vector (Shapefile, GeoJSON, KML) and raster (GeoTIFF, DEM) data
- How to export layers in other data formats.
- Creation, editing of attributes for geographical layers, adding fields
- Learn about field calculator, learn to calculate area of geographic features.
- Interacting with features in attribute table
- Learning of attribute and spatial queries`
- Joining the tables
- Exploring the tools in process toolbar
- Georeferencing the maps. It's very important for giving spatial reference to particular map using latitude and longitude information.

Spatial & Raster Analysis

- Vector Analysis: Basic statics, points in polygons, line intersection etc
- Geoprocessing Tools- Buffer, clip, Convex hull, intersect, union, difference, symmetrical difference, dissolve, Eliminate selected polygons
- Raster Analysis: Clip, DEM, slope, hill shade, raster calculator
- Overlay Analysis: Suitability mapping, weighted overlay

Advanced QGIS Tools

- Plugins & Extensions: Quick Map Services, Time Manager, QGIS2Web
- Remote Sensing: Import imagery, NDVI, land cover classification
- Normalized difference Vegetation Index (NDVI) calculation

Integration, Map Design & Final Project

- Cartography & Map Production: Layout design with scale, legends and export maps
- GPS & Field Data: Import GPX/CSV, edit survey points
- Web GIS Basics: Publish interactive maps with QGIS2Web, export KML
- Hands-On: Create professional map layout, import GPS data, export interactive map

Learning Outcomes

- Develop hands-on proficiency in managing and analyzing spatial data using QGIS.
- Create, edit, and visualize maps with professional cartographic quality.
- Apply spatial analysis tools for real-world decision-making and project planning.

Assignments

Includes **practical training, theoretical assignments, and expert interview guidance** to build complete industry readiness.

