

Basics of GIS and Arc-GIS 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.
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Introduction to ArcGIS Desktop (ArcMap / ArcCatalog / ArcToolbox)

- Introduction to ArcGIS interface and components.
- ArcMap: Data display, visualization, and map composition.
- ArcCatalog: Data organization and metadata management.
- ArcToolbox: Accessing geoprocessing tools for analysis.
- Coordinate Reference Systems (CRS) setup and management.
- Understanding map documents (.mxd) and project organization.
- Working with table of contents, layers, and symbology.

- Hands-On: Create and save an ArcMap project, load layers, and apply symbology.
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Spatial and Attribute Data Handling

- Adding Data: Shapefiles, feature classes, raster datasets, and tables.
 - Creating and Editing Data:
 - Create new shapefiles and feature classes in ArcCatalog.
 - Digitize points, lines, and polygons in ArcMap.
 - Use Editor Toolbar for geometry editing.
 - Apply snapping and topology rules during digitization.
 - Attribute Table Operations:
 - Add/edit fields, calculate geometry (area, length).
 - Perform attribute queries (Select by Attributes), select by location queries.
 - Join and relate tables for data enrichment.
 - Hands-On: Digitize a boundary map and attach attribute information.
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Spatial Analysis and Geoprocessing

- Understanding geoprocessing tools in Arc-Toolbox.
- Common tools:
 - Buffer, Clip, Union, Intersect, Dissolve, Merge, Erase.
 - Spatial Join and Overlay Analysis.
- Raster Analysis:
 - Extract by mask, raster calculator, slope, aspect, hillshade.
 - Convert between raster and vector data.
- Hands-On: Perform site suitability or land-use analysis using spatial overlays.

Map Design and Layout (Cartography)

- Principles of map design and cartographic standards.
- Creating map layouts: Titles, legends, scale bars, north arrows, grids.
- Using Layout View to export high-quality maps (PDF, JPG, TIFF).
- Apply labeling, classification, and symbology.
- Hands-On: Design and export a thematic map for presentation.

Learning Outcomes

- Gain proficiency in data creation, editing, and spatial analysis using ArcGIS Desktop.
- Develop ability to design professional maps
- Prepare for industry-ready roles in GIS analysis, mapping, and project execution.

Assignments

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