

GIS II Course Topics

1. Introduction to ArcGIS Pro

Note: Instructor-led walkthrough; presence assured during this session.

2. Digital Terrain Analysis

- Generate slope, aspect, and hillshade raster layers from a Digital Elevation Model (DEM).
- Derive and interpret surface curvature layers.
- Apply neighborhood analysis and raster algebra for advanced terrain modeling.
- Compare multiple DEMs to assess cut and fill extents.

3. Surface Hydrological Analysis

- Preprocess a DEM for hydrologic modeling using fill operations.
- Generate flow direction and flow accumulation grids.
- Delineate synthetic stream networks.
- Define watershed boundaries.
- Compute stream order classifications.

4. Vector Geoprocessing with ModelBuilder

- Use ArcGIS ModelBuilder to automate multi-step geoprocessing workflows.
- Develop vector-based geoprocessing models.
- Create custom toolboxes and tools.
- Convert ModelBuilder workflows into shareable ArcToolbox tools.

5. Raster Analysis with ModelBuilder

- Design and implement raster analysis workflows using ModelBuilder.
- Apply reclassification and raster calculator operations.
- Modify environmental settings for raster processing.
- Summarize raster outputs within polygon features.
- Perform table joins to enhance analysis.

6. Supervised Classification using Machine Learning

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Perform supervised classification of Sentinel-2 imagery using machine learning algorithms in ArcGIS Pro.

- Compare classification results using Support Vector Machines (SVM) and Random Forests (RF).

7. Working with LiDAR Data

- Create and manage LAS datasets.
- Filter and visualize LiDAR point clouds.
- Convert LiDAR data into raster products such as DEMs, DSMs, nDSMs, and intensity images.
- Analyze LiDAR-derived products.
- Extract raster values at point locations.
- Explore point cloud statistics and distribution.

8. Introduction to Spatial Statistics

- Calculate spatial measures of central tendency and dispersion.
- Assess point pattern distributions.
- Evaluate global spatial autocorrelation.
- Identify statistically significant hot and cold spots.

9. Density Mapping and Spatial Interpolation

- Generate and interpret density surfaces using kernel density estimation.
- Perform surface interpolation using IDW, spline, and Thiessen polygon techniques.