



# PB INSTITUTE OF RESEARCH AND TECHNOLOGY

P.O Box 21457-00100

Nairobi - Kenya

Mobile: +254 721 214 795

Email: [info@pebblesinstitute.org](mailto:info@pebblesinstitute.org)

## Advanced Spatial Analysis With Python & Qgis Training Course

Duration: 5 days

On-Site

### 01 Who Should Attend

- This course is ideal for:
- GIS Analysts & Professionals??? Seeking to enhance their spatial analysis and automation skills.
- Data Scientists & Researchers??? Working with geospatial datasets for predictive modeling and spatial insights.
- Urban Planners & Environmental Scientists??? Looking to apply advanced geospatial techniques for decision-making.
- Remote Sensing Specialists??? Aiming to integrate Python scripting into their remote sensing workflows.
- Students & Enthusiasts????? Wanting to build expertise in Python-based spatial analysis using QGIS.

### 02 About the Course

In the era of big data and geospatial intelligence, mastering **Advanced Spatial Analysis** is crucial for professionals dealing with location-based data. This **Advanced Spatial Analysis with Python & QGIS Training Course** equips learners with the skills to perform complex spatial modeling, automate GIS workflows, and analyze geospatial patterns using Python and QGIS. Participants will gain hands-on experience in spatial statistics, machine learning for geospatial data, and automation of spatial processes. Whether working in urban planning, environmental science, disaster management, or natural resource management, this course provides the tools to extract meaningful insights from spatial data.



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### **03 Workshop Objectives**

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- Master Python for Spatial Analysis??? Learn to manipulate geospatial data using Python libraries such as GeoPandas, Rasterio, and Shapely.
- Perform Advanced Spatial Statistics??? Apply spatial autocorrelation, clustering, and interpolation techniques.
- Automate GIS Workflows??? Use PyQGIS and Python scripting to enhance efficiency in QGIS.
- Integrate Machine Learning with GIS??? Apply ML algorithms for geospatial classification and prediction.
- Analyze Raster & Vector Data??? Conduct terrain modeling, network analysis, and spatial queries.
- ??? Develop Custom GIS Applications??? Build interactive geospatial tools using Python and QGIS. This course is designed to elevate GIS skills, empowering participants to perform advanced spatial analysis, automate geospatial workflows, and leverage Python for innovative GIS solutions.

### **04 Module Topics**

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#### **Module 1: Introduction to Advanced Spatial Analysis**

- ??? Overview of spatial analysis techniques and applications
- ??? Understanding vector and raster data processing
- ??? Introduction to Python scripting in QGIS

#### **Module 2: Python for Geospatial Analysis**

- ??? Setting up the Python environment for GIS (GeoPandas, Rasterio, Shapely)
- ??? Handling spatial data using Python libraries
- ??? Handling spatial data using Python libraries

#### **Module 3: Spatial Data Manipulation & Geoprocessing**



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- ??? Spatial joins, overlays, and topology corrections
- ??? Buffering, clipping, and dissolving spatial features
- ??? Batch processing and automation using Python scripts

## **Module 4: Spatial Statistics & Geospatial Data Exploration**

- ??? Descriptive statistics for spatial datasets
- ??? Spatial autocorrelation and pattern analysis
- ??? Hotspot and cluster analysis in QGIS and Python

## **Module 5: Raster Data Processing & Analysis**

- ??? Working with satellite imagery and DEMs in QGIS
- ??? Raster reclassification and spatial interpolation
- ??? Terrain analysis (slope, aspect, hillshade) with Python

## **Module 6: Network Analysis & Route Optimization**

- ??? Understanding network datasets and connectivity
- ??? Shortest path, service area, and accessibility analysis
- ??? Route optimization using QGIS and Python libraries

## **Module 7: Machine Learning for Spatial Analysis**

- ??? Introduction to machine learning for geospatial applications
- ??? Supervised and unsupervised classification of spatial data
- ??? Predictive modeling using Scikit-learn and geospatial datasets

## **Module 8: Geospatial Big Data & Cloud Computing**

- ??? Handling large spatial datasets efficiently
- ??? Integrating Google Earth Engine with QGIS
- ??? Cloud-based geospatial processing with Python

## **Module 9: Spatial Predictive Modeling & Simulation**



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- ▶ ??? Regression analysis for spatial prediction
- ▶ ??? Time-series analysis of geospatial data
- ▶ ??? Spatial simulation techniques for environmental modeling

### **Module 10: Web GIS & Interactive Mapping with Python**

- ▶ ??? Creating interactive web maps with Folium & Leaflet
- ▶ ??? Publishing geospatial data using GeoServer & QGIS Server
- ▶ ??? Developing web-based GIS applications with Python