

SC403 – Advanced Spatial Analysis with R and Python Programming

Course Duration: 5 Days

Training Fee: KSH 40,000 | USD 400

Course Registration: [Register Here>>](#)

1.0. Introduction



R and Python are widely used programming language and software environment for data science. **R** language has advanced capabilities for managing spatial data; and it provides unparalleled opportunities for analyzing such data. **R** provides a broad variety of libraries and tools for the following: Cleansing and prepping data; Creating visualizations; Training and evaluating machine learning and deep learning algorithms. R is commonly used within RStudio, an integrated development environment (IDE) for simplified statistical analysis, visualization and reporting. R applications can be used directly and interactively on the web via Shiny.

Python is a general-purpose, object-oriented programming language that emphasizes code readability through its generous use of white space. In fact, Python is one of the most popular programming languages in the world, just behind Java and C. Several Python libraries support data science tasks, including the following: NumPy for handling large dimensional arrays; Pandas for data manipulation and analysis; Matplotlib for building data visualizations.

1.1. Course Content/Outline

- ❖ **Basic Data Types:** Numeric and integer values; Character values; Logical values; Factors Missing values and time.
- ❖ **Basic Data Structures:** Matrix; List; Data.frame; vector;
- ❖ **Statistical Models:** Data exploration; Summary and table
- ❖ **Spatial Data:** An introduction Spatial Data handling in R and Python.
- ❖ **Spatial Data analysis:** An introduction to methods for description, prediction and inference with spatial data.
- ❖ **Remote Sensing Image Analysis:** Introduction to remote sensing (satellite) and drone image analysis spatial data.
- ❖ **Species Distribution Modeling with R and Python:** An in-depth tutorial for predicting the geographic ranges of species.

1.2. Case Study

Analyzing GIS Land use and Land Cover Data for Nairobi using R and Python Programming.