

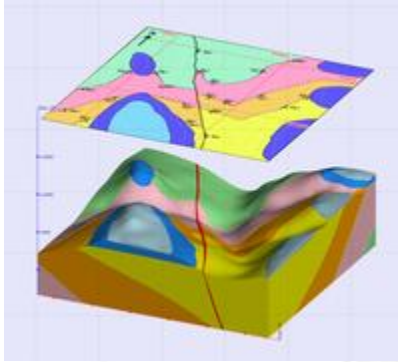
## CC301 - GIS for Spatial/Urban/Landuse Planning and Management Course

Course Duration: 10 Days

Training Fee: KSH 80,000 | USD 800

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

### 1.0. Introduction



Geographical information, when integrated with remote sensing, can save time in collecting land use and environmental information related to an urban area. High resolution satellite images are becoming an important source of spatial information for urban areas. They can help to detect land use and land use changes for urban areas. GIS technology plays a key role in analyzing the urban growth and its direction of expansion, and to find suitable sites for further urban development. In order to identify the sites suitable for the urban growth, certain factors have to consider which is: land should have proper accessibility,

land should be more or less flat, land should be vacant or having low usage value presently and it should have good supply of water.

### 1.1. Course Overview

GIS is a useful and powerful analytical tool for urban/spatial planning and urban management. This course also introduces Geographic Information Systems (GIS) to Urban Planning professionals, carrying out analysis, modelling and spatial design. As a practical course, the focus is to impart and enhance their analytical skills using GIS analytical tools for presentation, communication and decision making which forms the bedrock of urban and spatial planning as a profession. Students will have a basic understanding of the emerging field of Smart or Intelligent Urban Transport Systems (IUTS) and acquire basic knowledge of adopting GIS technology in transportation, e.g. how GIS and related spatial information technology application in IUTS components.

### 1.2. Course Objectives

This course will enable the participants to:

- i. Provide planning professionals with a full understanding of GIS & RS concepts, principles and how they can be applied for Urban and spatial planning.
- ii. Undertake field data collection and analysis for urban and spatial planning with GIS as well as data management and synthesis.
- iii. Utilize GIS and remote sensing tools to identify and map urban growth trends, patterns and problems within the planning sector in an urban context.
- iv. Perform various GIS analysis workflows and modelling to aid decision making in urban planning and management context.
- v. Learn GIS both as platform for creating spatial databases, analysis, modelling tool; and for disseminating information to internal & external stakeholders.

### 1.3. Learning Environment

The learning and teaching strategies will follow student centered mode. Through the lectures, in-depth reading and group discussions, the students will acquire advanced knowledge about application of Geo-technology in urban and spatial planning realm. The students will develop skills to use Geospatial techniques for data acquisition, processing and analyses of ground-based data as well as satellite sensed urban data. In this training, we shall employ an 80-20 approach i.e. 80% of the time for practicals whilst 20% for theory.

### 1.4. Course Content/Outline

#### i. Role of Remote Sensing in Urban and Spatial Planning:

- Introduction to Remote sensing data types (satellite platforms, satellite images etc.).
- Satellite/drone image resolution - spatial, temporal, spectral and radiometric resolution of an image.
- Satellite/drone image bands; band rationing; types of images; image mosaic; change detection; image feature extraction etc.
- Role of high-resolution satellite and drone images in spatial planning.

#### ii. Role of GIS in Development of Spatial Plans:

- What is an Urban Spatial Plan? What are the components and data requirements for an urban spatial plan?
- Over view of the 5 GIS components (Software, Hardware, Data, People and Procedures).
- GIS Data Types - Raster data, vector data and tabular GIS data.
- Scanning of maps or plans, georeferencing, digitization and attribution workflows.
- Process of creation, management, updating and maintenance of an Urban infrastructure GIS database.
- Application of GIS in Creation of a spatial plan and Land Information System.

#### iii. Land use Location-Allocation Modelling:

- Introduction to location-allocation GIS modelling in respect to urban and spatial planning.
- Urban growth spatio-temporal modelling using Scenario 360 and Community Viz software.
- Using GIS Geostatistical analysis tools to determine suitable land use in a given area.

#### iv. Urban Growth Modelling using STELLA Model:

- Overview of the drivers of urban growth in the city of Nairobi and their ramifications.
- Overview of different land use types in the city of Nairobi.
- Introduction to modelling using dynamic and simulation model - STELLA.
- Using Geospatial technology and STELLA to create land use model for Nairobi city.

#### v. Land use Demand and Supply Calculations:

- IS overlay operations (intersect, clip, aggregate, dissolve, union, spatial join, relate, buffer, spatial query etc.).
- Urban land use suitability computation and analysis using STELLA and Scenario 360.
- Using GIS to create land use demand and supply map for the Metro city of Nairobi.

#### vi. Urban Population Growth Modelling:

- Role of GIS and remote sensing in the creation of urban population growth models.
- Creating and simulating Nairobi population growth using STELLA model.
- Creation of simulations and animations; sensitivity analysis and calibration of the models.
- Creation of future urban population scenarios based of pre-defined parameters.
- Use of urban population models for urban policy formulation and implementation.

#### vii. Use of Geospatial Technology in Urban Transport Planning:

- What is a smart or intelligent urban transport system (IUTS)? And why IUTS?
- What are the components of a smart urban transport system?
- Role of Geospatial technology in smart urban transport system.
- Urban traffic modelling, introduction to Cellular Automation (CA); learn about Traffic Flow Model based on CA.

### 1.5. Case Study - Nairobi Traffic Flow Model:

- Introduction to NetLogo software - The Components and User and programming interface.
- Using NetLogo and other Geospatial tools to create urban traffic simulation model for Nairobi CBD.
- Calibrating the traffic model and carrying out the sensitivity analysis.
- Development and generation of future urban traffic scenarios for the city of Nairobi using NetLogo software.

### 1.6. Expected Learning Outcomes

On completion of this course, the participants are expected to:

- i. Obtain solid skills and experience in application of geo-information and earth observation techniques in urban and spatial planning.
- ii. Acquire knowledge and skills needed for the collection, interpretation, and management of spatial information, using remote sensing and geographic information systems to support urban planning.
- iii. Gain in-depth skills using Geospatial tools that help in development of spatial plans, urban GIS databases, zoning and for urban policy formulation and implementation.
- iv. Acquire hands-on skills and expertise in the use various spatial and urban planning platforms such as NetLogo, Scenario 360, Community Viz and STELLA amongst other software.

- v. Get acquainted with relevant GIS and other geo-techniques to provide project specific solutions in the field of spatial, urban and regional planning.

### 1.7. Training Materials (Hardware and Software)

1. A Laptop or PC;
2. Satellite/drone images;
3. NetLogo Software;
4. STELLA Model;
5. Microsoft Excel, SPSS;
6. ArcGIS or Q-GIS.

### 1.8. Training Style and Approach

- ❖ On-site instructor-led training;
- ❖ On-line training (optional);
- ❖ Use of PowerPoint Slides;
- ❖ Fieldwork Exercises;
- ❖ Use of Case Studies on Spatial Planning.

