

## BC103 - Building and Managing Geospatial Databases Course

Course Duration: 5 Days

Training Fee: KSH 42,000 | USD 420

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

### 1.0. Introduction

Databases used in Geographic Information System (GIS) are one of the most important entities of the system. Most GIS software use data stored in the form of tables. These data tables are the pillar of GIS. These tables are then linked to physical geographic locations which come in points, lines, or polygons. For example, a point on a map might look just like a point on a map to the non-GIS person. But behind that point on the map might lie address, parcel, or ownership data which is linked to that specific point. GIS databases use a technology to relate to each other enabling the system to complete complex analysis and queries. In order to keep up with the demand of data, maintenance needs to be completed on these databases on a regular basis.



### 1.2. Course Overview

Once data has been collected, imported to ArcGIS and edited, their processing into user information is not instantaneous; they must first be stored and retrieved as needed for processing. Learners will therefore first be introduced to basic database concepts since GIS incorporates much of the functionality of DBMS. This module will also expose the learners to the design and administration of spatial databases.

### 1.3. Course Objectives

- To understand the concept of spatial data management, as well as their importance.
- To get started with geodatabases in ArcMap
- To design, create and configure databases using Microsoft SQL
- Query data efficiently from tables in the Microsoft SQL Server database.
- Administer Microsoft SQL Server effectively

### 1.4. Course Content/Outline

#### i. Introduction to Spatial Data Management and Spatial Databases.

- Definition of core database concepts and terminology
- Types of database management systems, highlighting merits and demerits of each
- The Geodatabases: file geodatabases; personal geodatabases
- Getting started with file geodatabases: Creating a file geodatabase, creating a feature dataset, importing feature classes into the feature dataset, Adding metadata to the imported layers.

## ii. Design and Creation of a Geodatabase

- Loading and managing data in geodatabases
- Maintaining spatial and attribute data integrity using subtypes and domains
- Sharing a geodatabase

## iii. Designing Database Topologies

- What is a geodatabase topology?
- Why use GIS data topology?
- How topology works; topology rules for different workflows
- Build a topology: Create a project; Evaluate spatial relationships; create a topology; configure the topology; validate the topology

## iv. Geospatial Data Management using Microsoft SQL

- Introduction to Microsoft SQL; Installation, Interface, Server architecture, Operators, Aggregate and User defined functions.
- Data Types in Microsoft SQL – BIT, CHAR, DATE, DATETIME2, DATETIMEOFFSET, Decimal, INT, NCHAR, NVARCHAR, TIME, VARCHAR, EXPRESSIONS, CASE, COALESCE, NULLIF
- Data Definition in Microsoft SQL; Creating a new database, creating a schema, Creating tables – Identity columns, Primary Key, Foreign Key
- Data Manipulation in Microsoft SQL; Select, Where, Null, And, Or, In, between; Column and Table Aliases – Joins, Inner Joins, Left Join, Right Join, Union, Intersect, All, except; Common table Expression – Delete, Merge, Update, Insert, Insert Multiple Rows

### 1.4. Case Study: Development and management of GIS Database of Nairobi Health Centers

### 1.5. Expected Learning Outcomes

At the end of this course, learners should;

- i. Understand the fundamental concepts regarding geospatial data management;
- ii. Be proficient in designing and building a geodatabase using MySQL;
- iii. Be able to manage data within geodatabases;
- iv. Be able to perform and interpret simple to complex spatial queries using SQL.

### 1.6. Training Materials

- ArcGIS, QGIS
- Microsoft SQL
- A laptop/PC