

## AC211 - Survey Equipment Course - GNSS, Drone, Total Station & GPR

Course Duration: 7 Days

Training Fee: KSH 56,000 | USD 560

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

### 1.0. Introduction



Surveying is a very crucial discipline in the modern-day world as it plays a fundamental role in land development, right from planning and design of land subdivisions to the final construction of roads and other utilities. Surveyors are involved in a wide array of activities that bring some kind of order in our physical world including: determination of property boundaries, land subdivision, locating detail on the earth's surface for production of maps, setting out of drains, railways, roadways, sewers, bridges, among so many others. Technological advances have over time modernized measuring methods for the surveyor. Some of the most modern inventions are discussed in this course, and how these are being applied to benefit surveyors and the society in general.

This course will cover the training in all the modern survey equipment including but not limited to the Level Machine, Drone, Total Station, GNSS and GPR.

### 1.1. Course Overview

The aim of the course is to provide an understanding of surveying and mapping of earth surface using a level, total station, drone and GNSS and select mapping software. The course covers an introduction to surveying followed by fundamentals of a level, total station, drone and GNSS, and their working & measurements for different kinds of surveying.

### 1.2. Course Objectives

- To learn the basic and advanced concepts of surveying and mapping.
- To understand how the modern surveying equipment, work.
- To use the level, total station, drone and GNSS for real world applications

### 1.3. Course Content/Outline

#### Introduction to Surveying Technology

- Definition of core surveying principles and terms;
- Branches of surveying: Cadastral survey, Engineering survey, Topographical survey, Aerial and Drone survey; Bathymetric and Hydrographic survey.
- Survey Ground Control Points (GCPS) and Benchmarks.

#### Surveying using a Level Machine

- Definition of leveling terms: Reduced Level, Benchmark, Line of Collimation, Level Line, Backsight, Foresight, Level Datum, Change Point, etc.;

- Types of levels and levelling equipment: Levelling Staff, Automatic Level, Tilt Level, Dumpy Level;
- Introduction to the Automatic Level: Parts of the instrument; Setting up - levelling and centering, Sighting;
- Booking levelling readings: Height of collimation and Rise and Fall Methods;
- Applications of Levelling\*
- **Case Study:** Determine Levels of Karen Village Controls

### Surveying using a Total Station

- Introduction to the Total Station: Parts and Functions, Models, Modes of operation, Menu System;
- Setting up the Total Station – Levelling and Centering, Sighting and Bisecting, Orientation;
- Surveying – Field Data Collection; staking out; traversing; topographical surveys
- Downloading data and plotting to AutoCAD Civil 3D;
- **Case study:** Topo survey using Total Station at Karen Village.

### Surveying using a Drone

- Introduction to Drone Surveying; Types of drones; Operating Principles, Flight Planning;
- Introduction to Drones for Surveying: DJI Phantom 4, eBee Sensefly; Parts of a drone;
- Processing Drone Mapping data; Orthomosaics, 2D Maps, 3D digital models, Digital Terrain Models, Report Generation;
- Introduction to drone mapping software and platforms – Pix4D, Agisoft Metashape, Drone Deploy;
- **Case Study:** Drone Mapping of Karen Village

### Surveying using GNSS/RTK

- Introduction to GNSS concepts and operating principles;
- Types of GNSS Surveys: Static Surveys, Real-Time Kinematic Surveys, Positioning Surveys;
- GNSS Equipment: Receivers, Antennae, Rover Rods, Tripods and Bipods;
- GNSS Survey Operations: Base-Rover Configuration;
- Continuous Operating Reference Stations (CORS);
- Post Processing workflows of Static Survey Data and error adjustments.
- **Case Study:** Topo survey using GNSS/RTK at Karen Village

#### 1.4. Case Study: Karen Village Detailed Land and Topo Survey, Mapping and Data Processing

#### 1.5. Expected Outputs:

At the end of this module, learners are expected to:

- Understand the surveying concepts using Total Station, RTK, Drone and GPR.
- Have hands on skills in using the automatic level, drone, total station and GNSS for real time applications.
- Understand the operations of CORs systems including static data post-processing.
- Be able to process data after Field Data Collection and produce deliverables.
- Be competent in the use of modern survey equipment in field data collection

### 1.6. Training Material (Hardware and Software)

- Automatic Level
- Levelling Staff
- Total Station
- Prism and prism pole\*
- DJI Phantom 4 drone
- Stonex GNSS Receiver\*
- US Radar GPR
- Aluminum Tripod
- A laptop/PC
- AutoCAD Civil 3D
- Pix4D Software

### 1.7. Who Should Attend

- Geospatial/GIS Experts
- Professionals in Land Surveying
- Professionals in Engineering Surveying
- Professionals in Construction Industry
- Urban Transport Sector
- Civil Engineering industry

