

BC108 – Satellite/Drone Image Analysis and Processing Course

Course Duration: 4 Days

Training Fee: KSH 32,000 | USD 320

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

1.0. Introduction



Remote sensing technologies have revolutionized the way we see our world. It is an advanced surveying and data collection methodology that uses airborne sensors to capture important environmental or structural information about various phenomena, without coming into contact with these. When paired with machine learning and mapping software, remote sensing is able to convert raw image data into measurable 2D and 3D maps through image analysis

methods, and provide intelligence which is used by the military, civil engineers, various navigation and transportation industries, urban planners, government administration, policy makers among so many others. For instance, using remote sensing, farmers are able to track changes in ecosystems, provide verification for crop insurance, and support research efforts.

1.1. Course Overview

This course will look into methods of carrying out satellite image analysis, by making use of the tools provided by the ILWIS software. ILWIS contains a set of image processing tools for enhancement and analysis of data from space borne or airborne platforms. In this course, the routine applications such as image enhancement, classification will be introduced to learners.

1.2. Course Objectives

- To be introduced to remote sensing concepts
- To learn how to work with satellite imagery
- To get started on Satellite Image analysis using ILWIS

1.3. Course Content/Outline

i. Introduction to working with Satellite imagery

- What is satellite based remote sensing?
- Development of remote sensing technology and advantages
- Different platforms of remote sensing
- Satellite orbits, Satellite System Components
- EM spectrum, solar reflection and thermal emission remote sensing
- Interaction of EM radiation with atmosphere including atmospheric scattering, absorption and emission
- Interaction mechanisms of EM radiation with ground, spectral reflectance curves
- Principles of image interpretation

- Multi-spectral scanners and imaging devices
- Salient characteristics of LANDSAT, IRS, Cartosat, ResourceSat etc. sensors
- Image characteristics and different resolutions in Remote Sensing.

ii. Satellite Image Analysis using ILWIS

- **ENVI system overview;** Main concepts of ENVI; Map layers, collections and Data structures;
- Display system, ILWIS Modules; Spatial data input; ILWIS modeling tools; Database development; Decision strategy analysis.
- Spatial data management; Attribute data handling.
- **Visualization of single band images;** Display a satellite image; Zoom in/out on a displayed satellite image; Scrolling through a displayed satellite image; Displaying multiple images; Digital numbers and pixels and real-world coordinates
- **Image enhancement;** Contrast enhancement - Calculation of a histogram; Linear stretching; Compare original and stretched images; Different linear stretch functions; Histogram equalization; Spatial enhancement - Low pass filters, Create and apply a user-defined low pass filter, High pass filters.
- **Visualizing multi-band images;** Color composites; Interactive false and pseudo natural color composites, Permanent Color Composites.
- **Geometric corrections and image referencing;** Geo-referencing using corner coordinates, Geo-referencing a raster image using reference points, Image-to-image registration, Geo-coding a raster image by resampling.
- **Multi-band operations;** Image ratios: Brightness variations; Normalized Difference Vegetation Index; Multi-band statistics; Principal components analysis; Image arithmetics; Image fusion.
- **Image classification;** Density slicing; Interactive slicing; Slicing operation; Piece-wise linear stretching; Multi-spectral image classification; Sampling; Displaying Feature Spaces; Classification; Classification methods.

1.4. Case Study: Analyzing Sentinel Satellite Images for Sony Sugar Farms in Migori County

1.5. Expected Outcomes

At the end of this training module, the learner should:

- Understand remote sensing concepts and satellite image analysis techniques
- Be proficient in using ENVI for satellite image analysis

1.6. Training Materials

- A laptop or PC
- ENVI software
- ERDAS Imagine
- Satellite Images