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Course Breakdown and costing

Keystone courses: (Foundation, Intermediate & Advanced)

Do you know what a drone is? Did you know that they can be used as powerful data collection tools? Do you know what photogrammetry is? Do you know what Geographics Information Systems(GIS) Software is? If you have answered "no" to any of the above questions then you have come to the right place! The GeoWing Academy Foundation (Basics), Intermediate and Advanced courses will take complete novices (or even experts) and upskill you to new heights and will form the foundation of your entire drone based GIS learning at GeoWing Academy. Learn all there is to know about drones, their history, what photogrammetry is and how GIS analysis can provide unparalleled insight into the world around us. With interesting lectures and practical components, these courses are designed for everyone! By completing these courses you will be able to complete the specialised courses related to Conservation, Agriculture, Industry and more with ease.

Foundation course (USD $100-00)

The Foundation (Basics) Course will provide you with everything you need to know in order get going using your Red Green Blue (RGB) camera consumer drone as a data capture platform. The Foundation Course consists of 4 parts. A two-part Basics Theory lecture will cover:

Part 1 (for those who are brand new to UAVs and photogrammetry):

- A history of UAVs
- Types of civilian UAVs
- Drone payloads (sensors, camera etc)
- What is photogrammetry?
- What is GIS?
- How UAV data and photogrammetry outputs can be used in different software platforms to quantify the world in different ways with examples.
- Drone laws and regulations (according to International Civil Aviation Organisation)
- UAV considerations

Part 2 (pre-practical lecture):

- Available autonomous flight apps for DJI drones
- What the different programs are used for (WebODM and QGIS)
- How to best set up your camera for data capture

- How to plan a mapping mission
- Mission planning video showing how to use a flight automation app to capture data correctly.
- What to consider before flying and what to consider before planning an operation.
- Useful tips and tricks
- General aviation regulations according to ICAO/FAA (and the differences between civilian and commercial drone use).

Followed by a two-part practical course, the Basics Practical component will cover:

Part 3: WebODM Photogrammetry Practical:

This course will cover the basics of how to generate maps and models from drone captured data (explained in the Getting started Lecture). You will need to download and install WebODM (this course uses version 2.2.0 build 102) from Software/ Hardware Requirements Page to complete this course along with the free data set.

- How to correctly file your raw drone data and create folders for post photogrammetry outputs (data organisation for consistency)
- How to use photogrammetry software to generate maps and 3D models
- How to navigate through different photogrammetry outputs and what they mean
- How to use measurement tools, create shape files and contours in photogrammetry software
- Useful tips and tricks
- Brief look at photogrammetry reports and what the information means
- Export maps and models correctly for following GIS course.
- Free drone data is provided for this course (check Course System Requirements page to make sure your computer can run the programs and therefore the data set)

Part 4: Quantum Geographics Information Systems(QGIS) Practical:

This course will cover the basics of Geographics Information Systems software (GIS) and follows on from the WebODM practical. *If you are unable to process the data set from the WebODM course for whatever reason, please download the pre-processed data for this course! You will need to download and install QGIS (this course uses QGIS version 3.22.15 Bailowieza) from the Software/ Hardware Requirements page to complete this course.

- Add orthomap and digital surface model (raster layers) outputs from previous WebODM course to QGIS and order the layers correctly
- Raster layer properties menu and what it entails
- The importance of Coordinate Reference Systems (CRS)
- How to change visualisation of layers to better represent digital landscape information
- How to use quick measurement tools
- How to use feature identification tool, why it is so useful and what data it shows
- Learn how to add vector layers (digitizing) to raster layers
- Understanding attributes tables.
- Learn how to add measurement information to vector layers
- How to add labels, buffers and change styles of vector layers for better representation.
- Useful tips and tricks
- Free data is provided for this course (check Course System Requirements page to make sure your computer can run the programs and therefore the data set)

This in-depth course will give you the best foundation for acquiring, processing and understanding the power of aerial image data modelling. All training data is supplied for this course.

Intermediate Course (USD $150-00)

The intermediate course will look at using GIS to analyse vegetation health and quantifying vegetation data using RGB data. This will form a base line data set which can be used to monitor vegetation over time. You will need to download and install QGIS (this course uses QGIS version 3.28.14-Firenze) and Cloud Compare (this course uses 2.12.4 Kyiv, Stereo) from the Software/ Hardware Requirements page to complete this course. It is recommended that you complete the Basics course before attempting the Intermediate course. Here we will look at how to use photogrammetry outputs to:

Part 1:

- Introduction
- Indexing
- Raster Calculator
- Understanding output
- Data tables
- Data Reclassification
- Cleaning data (sieving)
- Study site isolation
- Thresholding data
- Data quantification using raster data
- Zonal Stats
- Exporting data to Excel
- Data quantification using vector layers
- Converting raster data
- Visualising digitizing
- Field calculating data
- Stats By Category
- Data analysis in Excel

Part 2:

- Introduction
- Modified Photochemical Reflectance Index
- Understanding Histograms
- Visualising 3D data
- Preparing map data for reporting purposes
- Subsample a section of vegetation & visualise plant heights (an introduction to Cloud Compare)
- Free data is provided for this course (check Course System Requirements page to make sure your computer can run the programs and therefore the data set)
- This course will provide you with a good understanding of how to conduct large scale vegetation health surveys and how to package the quantified analysis outputs into base line reports.

Advanced Course (USD $175-00)

Follow on from Intermediate Course Part 2. Understanding the importance of the knowledge gained from the Basics & Intermediate Courses, this course will teach you how to automate the multi-step and complex processes learned in the Basics and Intermediate courses. These skills will allow you to streamline your workflow and allow the computer to do the tedious work. There are also a few additional neat outputs that will help you when consolidating different software platforms in the more specialised projects related to conservation, mining, agriculture and forestry. You will need to download and install QGIS from the Software/ Hardware Requirements page to complete this course. You will have to have completed the Basics and Intermediate courses first to complete this course correctly for a full understanding of what is going on in this course.

Part 1: Introduction

- Follow on from Intermediate Course Part 2
- Understanding the importance of the knowledge gained from the Basics & Intermediate Courses in order to configure processing automation correctly

Process Automation

- What is it?
- How it works?
- Add layering
- Adding algorithms
    - Clip Target Site
    - RGB splitting (the importance of choosing the correct layer & processing sequences)
    - Index Calculation (for QGIS versions 3.34.8 & older)
    - Reclassify Index
    - Cleaning data
    - Convert to polygons
    - Add data
- Process sequencing
- Linking processes
- Checking steps to ensure correct out puts

Part 2: Advanced Calculations & Trouble Shooting

- Complex Field Calculations. Calculating specific data using field calculator (Aggregating area data to align with DN values)
- The basics of working with data in Microsoft Excel
- Trouble Shooting automations when using map data of another site in a different UTM.
- Tips & Tricks
- BONUS TIPS: Ensuring that your study site is identified correctly each time you fly your site. This helps when looking at specific sites without the need for RTK precision.

BUNDLE VALUE PACKAGE FOR KEYSTONE COURSES (Foundation, Intermediate & Advanced): USD $400-00

Course Breakdown and costing

Conservation & Agriculture (currently available courses)

The agricultural courses will teach you how to use your off the shelf drone to assist growers, UAV service providers and interested parties in all things agriculture. Learn how to monitor fields, assess plant health, produce reports, identify areas of plant stress, assess field productivity and quantify agricultural information and so much more! Learn creative ways to use your RGB drone and GIS to help manage your farm. Note: these methods can translate when using multispectral drone data as well.

Dam It Course (Conservation/Agriculture) USD $100-00

In this course you will learn how to estimate a number of quantities for a potential dam/reservoir site in 3.34.8-Prizren. This course is perfect for those who would like to accurately survey and estimate the flood plain, dam wall length, spill way height, dam wall facade area and the volume of a potential irrigation dam, water reservoir or slime dam using UAV data, photogrammetry outputs and GIS. I have left in some of the glitches so that you can see how open source is not always optimised when it is updated or alternative versions of the software are used, this will ensure that it does not come as a surprise when using updated or older/ newer versions of the software. You will need to download and install QGIS from the Software/ Hardware Requirements page for this course. In this course you will learn:

Part 1 – Dam wall designation; determine flood plain & area, dam water volume, wall length

- Generating Dam Base Vectors
  - How to use points as dam wall markers
  - Generate contours
  - Isolate dam contours using query builder & Split features
- Generating virtual dam wall
  - Snapping wall to floodplain
  - Merging wall to floodplain
  - Generate wall & floodplain lengths in metres
  - Prep Attribute Data for further analysis

- Generate Dam Polygon
    - Convert line features to polygons
    - Fix data
    - Generate dam area in metres squared
    - Understanding attribute table outputs
    - Calculate dam volume in cubic metres
    - Attribute Table Information
- Make it pretty
    - Visualise the data
    - Tips & Tricks

Part 2- (Coming Soon)

In Part 2 we look at how to estimate the façade area of the dam wall in metres squared. This will help us calculate the volume of materials needed to construct a theoretical dam wall for the predetermined dam calculated in Part 1.

- Group Data from Part 1
- Creating point information in attribute table for wall height segmentation
    - Creating intersection points
    - Adding x, y coordinates to points
    - Calculating height from ground point to the top of the theoretical dam wall
    - Correct sequencing of point information
- Calculating the different lengths between each points on the ground (wall base profile segmentation)
- Saving data and troubleshooting saving issues.
- Exporting data table to Excel, correcting for Z value at point 1, organising data table.
- Calculating segmentation areas and over all wall façade area in metres squared.
- Looking at dam area computation differences
- Reorganising and consolidating raw data into single table#
- Tips & Tricks

River Me Timbers (Estuary Ecology) – (USD$100-00)

Part 1 - Introduction

This course will be looking at monitoring river estuary changes over time using drone photogrammetry data related to sediment deposition and erosion as well as estuary environment health monitoring. This is useful for managing estuaries in protected areas as well as areas where infrastructure lining river mouth may be affected by high tides or inland flooding. This will also provide much needed insight into how estuaries function over time and will prove invaluable for river management. This course is primarily based on using 3D point clouds.

- Introduction
    - Estuary monitoring background

        - Why is it necessary
        - Visual overview of two different data sets in QGIS
    - Data Processing
        - Load data into Cloud Compare
        - Manually align point clouds
        - The importance of data alignments
        - Navigation tricks
        - Difficulties with water & photogrammetry.
        - Checking data alignment & fixed feature consistency using points to point distance.
        - Understanding scalar fields & noise
        - SAVE, SAVE, SAVE!!
        - Removing “noise”
        - Change detection. Calculating erosion & deposition
        - Visualising the change detection.
        - Changing colour ramps for more complex environments & visualise finer details
        - Alignment faults & the importance of over scanning a site.
        - Tips & Tricks

Part 2 - (Coming Soon)

- Introduction
    - Estuary monitoring background
- Data Processing
    - Preparing segmentation polyline for sediment deposition isolation
    - Clip points to polyline
    - Calculating sediment deposition volume
    - A discussion on refining data for volumetric calculations
    - Verify data alignment & assessing differences
        - Comparing Change data (interpolated vs empty)
        - Checking z axis change data (ODM vs CC)
        - Deciding on calculation method (what to consider)
- Bank vegetation overview

Free data is provided for this course (check Course System Requirements page to make sure your computer can run the programs and therefore the data set)