

Day 1

First Part (2 Hours)

Introduction and programme of operations for the week

- History and relevance of survey;
- Installation of software: Agisoft Metashape, Autodesk Recap, Autodesk Autocad and QGIS

(Windows operating system software will be provided by me)

Break

Second Part (2 Hours)

The methodologies of direct and indirect surveying: active and passive sensors, satellite surveying, photogrammetry and manual metre.

- Direct and indirect survey: when a rigid tape measure can save or complicate your life;
- Manual data acquisition methodology: Eidotype, dimensioned plan, trilaterations and measurements;
- Total Station: Less is more, the advantage and disadvantage of a celerimetric survey;
- Stand-alone and mobile laser scanners: When, how and why to use them;
- GNSS station and coordinate system: Satellite celerimetric surveying and the importance of coordinate systems;
- Terrestrial and aerial photogrammetry: Strengths and weaknesses of the methodology.

Day 2

First Part (3 Hours)

Direct survey exercise

The exercise will take place in a space within the university, the students will be divided into working groups of 4 to 5 people. Each group must be equipped with:

- A tape measure;
- Paper tape;
- Pencil;
- A4 blank sheets of paper;
- Computer.

At the end of the exercise, students should process the data in the classroom.

Break

Second Part (1 Hour)

Survey planning with active sensor and satellite instruments

- Open polygonal and closed polygonal: Which to use and when;
- Cornerstones and fiducial points: Anchoring a survey for site management and cadastral maps;

Day 3

First Part (2 Hours)

Photogrammetric data acquisition methods

- Data acquisition trajectories and positions: Planning to Optimise;
- Photographic shooting techniques: Frontal, Nadiral and Foreshortening;
- Homologies and Overlap: The SFM (Structure From Motion) algorithm and how to avoid overlap;
- Markers: Ground Control Point, Ground Quality Point and QR Marker, what they are and how to use them.

Break

Second Part (2 Hours)

Photogrammetry exercise

- *Preparing the processing dataset: Tools and masks;*
- *Manual and automated workflow: When to work on the PC in order to sleep at night;*

The exercise is aimed at learning how to use the Agisoft Metashape software. Students should be equipped with a PC and will be given a dataset to process.

Day 4

First Part (2 Hours)

Photogrammetry exercise

Students will be grouped in the same working groups and will practise producing a photographic dataset. The use of the drone, total station and laser scanner will be demonstrated during the exercise.

Students must be provided with a camera or mobile phone with a high-resolution camera

Break

Second Part (2Hours)

Photogrammetric data processing: Agisoft Metashape

- *Preparing the processing dataset: Tools and masks;*
- *Manual and automated workflow: When to work on the PC in order to sleep at night;*
- *Marker identification and calibration: Registration and confirmation of digital markers;*
- *Instrument data input: How to import metric and georeferenced data into the software.*

The dataset processed will be the one produced during the first part of the day

Day 5

First Part (2 Hours)

Survey Output

- *Point clouds, models and orthophotoplanes: What they are and when to use them*
- *From point cloud to cad: How to interrogate a cloud for a survey*
- *From model to 3D print: How to export a 3D printable datum;*
- *From orthophotoplanes to Cad and QGis: How and when to import data into software.*

Break

Second Part (2Hours)

Gis and Cad

- *Importing, exporting and georeferencing data in Qgis*
 - *From gis to cad and cad to gis: how to make life easier.*
-

Lecture hours may be extended depending on the problems the students encounter during the exercises.

If, due to the problems described above, the lesson schedule changes, it will be extended for an additional day.

There will be no skipping of the programme.