3D Data Acquisition (E775000)

Course size *(nominal values; actual values may depend on programme)*

Credits 6.0   **Study time 170 h**

Course offerings and teaching methods in academic year 2024-2025

A (semester 1)	Dutch	Gent	excursion
			practical
			lecture

Lecturers in academic year 2024-2025

| Deruyter, Greet | | TW15 | lecturer-in-charge |

Offered in the following programmes in 2024-2025	**crdts**	**offering**
Master of Science in Land Survey Engineering Technology	6	A

Teaching languages

Dutch

Keywords

3D, data acquisition, progression of errors, teledetection, photogrammetry, hydrography, bathymetry, laser scanning

Position of the course

Special surveying techniques:

This component aims at treating some surveying methods, which because of the use of specific techniques and/ or requirements, deviate from the "ordinary" land surveying data acquisition methods. Following topics are covered: adjustment theory, hydrography and bathymetry, teledetection and photogrammetry, (terrestrial) laser scanning, legislation concerning the use of drones for data acquisition.

Contents

Surveying practice:

- GNSS: the basic knowledge is completed by practical measurements en the use of Flepos in relation to the multidisciplinary project land surveying.
- The least square method is used for the calculation of experimental accuracies and for solving problems concerning the propagation of errors and the assessment of the quality of measurements done during the multi disciplinary project land surveying.
- The students apply the ISO-17123 as teamwork.

Special surveying techniques:

- *Bathymetry and hydrography:* description and definitions, overview of methods for horizontal and vertical positioning on and under water, bathymetry: under-water acoustics, single beam, multi beam, side scan sonar, tides, tide measuring, calibration, accuracies, presentation forms. The theory is complemented with (a) company visit(s) and attending seminar(s) depending on the offer.
- *Introduction to teledetection and photogrammetry:* basic concepts and definitions concerning teledetection, teledetection platforms, aerial photography, photo interpretation, photogrammetry, photogrammetrical restitution, stereoscopy, ortho photo, earth observation satellites, Structure from Motion (SfM), data acquisition with drones …
- *Laser scanning:* overview of scanning platforms, principles of phase- pulse- and triangulation scanners, setting up a data acquisition campaign, field work, data

processing. The students execute a small scan project.

Initial competences

Builts on competences acquired in Topography I, Topography II and Map Projections.

Final competences

1 The student has an insight in the application area, the possibilities and the restrictions of several specialised measuring techniques in the field of bathymetry, laser scanning, photogrammetry.

2 The student is able to assess and - if advisable - implement relevant techniques in the field of land surveying in the broadest sense. This implies due attention to safety on the work floor and respect for the equipment.

3 The student decides on the most appropriate measuring techniques and instrument choice, given a specific context. The student selects the most appropriate (combination of) data acquisition methods in function of the boundary conditions.

4 The students have an insight in the relation between the instrumentarium and the accuracy to be expected of the coordinates and the mapping process.

5 The students use the ISO-standard to determine the experimental accuracy of the instruments.

Conditions for credit contract

Access to this course unit via a credit contract is determined after successful competences assessment

Conditions for exam contract

This course unit cannot be taken via an exam contract

Teaching methods

Group work, Excursion, Lecture, Practical

Extra information on the teaching methods

Lectures, complemented with seminars and/ or company visits, field work and demonstrations, depending on the opportunities.
Field work using GNSS equipment and practice of the GRB specifications is done linked with the Multidisciplinary project.

Study material

Type: Handbook

Name: 3D Risk mapping - Theory and practice on Terrestrial Laser Scanning
Indicative price: Free or paid by faculty
Optional: no
Language : Dutch
Author : Bjorn Vangenechten with contributions from Huseyin Caner, Erwin Heine, José Luis Lerma García, Ronald Poelman, and Mario Santana Quintero
Online Available : Yes

Type: Syllabus

Name: Inleiding teledetectie en fotogrammetrie
Indicative price: Free or paid by faculty
Optional: no
Language : Dutch
Available on Ufora : Yes

Type: Syllabus

Name: Bathymetry
Indicative price: Free or paid by faculty
Optional: no
Language : Dutch
Available on Ufora : Yes

Type: Slides

Name: several series
Indicative price: Free or paid by faculty
Optional: no
Language : Dutch
Available on Ufora : Yes

Type: Other

 Name: ISBN 17123
 Indicative price: Free or paid by faculty
 Optional: no
 Language : English
 Available on Ufora : Yes

References

The teacher notes contain a reference list

Course content-related study coaching

Personal contact with the teacher: the teacher is available outside the contact hours for answering questions and solving practical problems concerning the course (by means of e-mail, or after appointment).

Assessment moments

end-of-term and continuous assessment

Examination methods in case of periodic assessment during the first examination period

Written assessment

Examination methods in case of periodic assessment during the second examination period

Written assessment

Examination methods in case of permanent assessment

Assignment

Possibilities of retake in case of permanent assessment

examination during the second examination period is not possible

Extra information on the examination methods

Theory: written examination
Assignment: report
The report contains the results of the application of a part of the ISO-17123 norm for the determination of the experimental standard deviation on the coordinates obtained by a total station.

Calculation of the examination mark

written examination: 90%
assignment: 10%