

Teledetection: Image Registration and Processing (C001045)

Due to Covid 19, the education and evaluation methods may vary from the information displayed in the schedules and course details. Any changes will be communicated on Ufora.

Course size (nominal values; actual values may depend on programme)
Credits 5.0 Study time 150 h Contact hrs 52.5 h

Course offerings and teaching methods in academic year 2020-2021

A (semester 2)	Dutch	Gent	seminar: coached exercises	30.0 h
			lecture	22.5 h

Lecturers in academic year 2020-2021

Goossens, Rudi WE12 lecturer-in-charge

Offered in the following programmes in 2020-2021

	crdts	offering
Master of Science in Teaching in Science and Technology (main subject Biology)	5	A
Master of Science in Biology	5	A

Teaching languages

Dutch

Keywords

Analogue data interpretation, digital image processing, vegetation mapping

Position of the course

Introduction to basic principles of aerial photography, photogrammetry, photo-interpretation, remote sensing and image processing.

To learn how to use remote sensing data as a base for thematic mapping and how to integrate these documents in a Geographical Information System.

To develop skills in observation and remote sensing data analysis.

Contents

As an introduction an overview is given of the different platforms and sensors used in remote sensing, and their technical characteristics:

- Analogue data: aerial photographs, satellite photographs (Russian data, KFA-1000, KVR-1000, Corona)

- Digital data: scanned images, air- and space borne (like Landsat MSS, TM and ETM+, Ikonos, ASTER, MODIS, SeaWiFS, MISR), radar (ERS-data), etc.

The first part of the course deals with analogue data interpretation

- Films : Black and White, Colour, Colour Infra-red and Black and White Infrared

- Analogue image interpretation (theory and exercises are parallel):

* Theory : introduction to photogrammetry, visual interpretation: building of interpretation keys, analytic and holistic approach, interpretation of different vegetation types, degradation phenomena and land cover classes

* Exercises:

- stereoscopic height measurements (applied on forests)

- interpretation of colour-infrared photographs in order to evaluate different vegetation degradation phenomena

- mapping of the interpreted phenomena using a synergistic approach (for the same area different mapping tools are combined)

In the second part attention will be paid to digital image processing:

- Passive earth observation satellites: visible and near infrared wavelengths scanner types; thermal scanners, hardware, functioning and data pre-processing

- Microwave remote sensing : basic principles, image acquisition; satellite platforms; interpretation of microwave data

- Digital image processing :

* Image pre-processing:

- image enhancement
 - image correction : radiometric and geometric correction techniques (including the use of GPS-technology)
 - * Image interpretation : different digital interpretation methods, supervised and non-supervised, are discussed; With special attention to biomass estimations and determination of chlorophyll contents in water bodies
 - * Evaluation of image accuracy
 - * Georeferencing the results
 - * Integration of the interpretation products (classified and geometric corrected images = maps) in GIS environment
 - * Cartographic layout of the different GIS-layers
- The exercise materials are available for different biospheres (northern latitudes, steppe, savannah, tropical forests, estuaria, coasts) and geographic regions (Flanders, Africa, Azia and South-America).
Stereoscope room and PC room with licensed software (IDRISI, ILWIS, Arcview) are available at the Geography Department. The digital image processing exercises are made with following satellite images: Landsat TM and ETM+, SPOT, ASTER, SeaWiFS, MODIS.

Initial competences

Basic knowledge as stipulated in the final objectives for secondary education
To participate in this course taught in Dutch, one should fulfill the general language requirements for Master's programmes taught in Dutch, as mentioned in the Education and Examination Code. However, the lecturer of the course can make exceptions to this rule for individual students.

Final competences

- 1 To have knowledge of the basics in aerial photography, aerial photo- and digital image interpretation and the metrical analysis of aerial photographs.
- 2 Skills in observation and remote sensing data analysis.
- 3 Multi-temporal and multi-scale analysis of remote sensing data and cartographic representation.

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

Lecture, seminar: coached exercises

Learning materials and price

Syllabus and exercise notes at costs
Aerial photographs and satellite data (analogue and digital versions) are available during exercises
Obligatory handbooks:/
Cost: 10 EUR

References

Lillesand, T. & Kiefer, R., 1994, Remote Sensing and Image Interpretation. (Wiley, New York)."

Course content-related study coaching

Lecturer and assistants (AAP)

Evaluation methods

end-of-term evaluation

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

Written examination with open questions, oral examination

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

Written examination with open questions, oral examination

Examination methods in case of permanent evaluation

Possibilities of retake in case of permanent evaluation

not applicable

Extra information on the examination methods

Theory: written and oral

Exercises: evaluation of the written rapport

Calculation of the examination mark

100% periodic evaluation