GHENT UNIVERSITY

Course Specifications

Valid as from the academic year 2023-2024

Monitoring Systems in Agriculture (I002651)

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

Credits 5.0 **Study time 150 h**

Course offerings in academic year 2023-2024

A (semester 1)	Dutch	Gent

Lecturers in academic year 2023-2024

Maes, Wouter	LA21	lecturer-in-charge
Degroote, Jeroen	LA22	co-lecturer

Offered in the following programmes in 2023-2024	**crdts**	**offering**
Master of Science in Bioscience Engineering: Agricultural Sciences	5	A

Teaching languages

Dutch

Keywords

Unmanned aerial vehicle, remote sensing, satellite, GNSS, precision agriculture, data processing, thermal, plant sensors, animal sensors

Position of the course

The purpose of this course is to give the students insight of the different sensors and monitoring systems in agriculture and animal husbandry, with special attention to the most recent advances, such as UAVs, biometry in animal husbandry and plant sensors.

Contents

Course content:
1) Reflectance in the visual and near infrared spectrum: basic principles and application in agriculture
2) Thermal remote sensing: basic principles and application in agriculture and animal husbandry
3) Satellites and drones: practice, application and future perspectives in agriculture
4) Image and data processing and interpretation, including structure-from motion, machine learning and deep learning technology
5) Precision GNSS: basic principles and application in agriculture and animal husbandry
6) Sensors for crop monitoring
7) Sensors in animal husbandry
Practical classes:
1) Performing a UAV flight, including ground references (classes 1-3)
2) Image processing of UAV data (orthomosaicing (class 4)
3) GIS-processing of orthophotos and interpretation of UAV imagery (classes 4 & 5)
4) Plant sensors: processing of existing dataset (class 6)
5) Sensors in animal husbandry: practical application in real-farm situation (class 7)
Sensors in animal husbandry: processing of existing dataset (class 7)

Initial competences

General knowledge on agricultural production, as obtained in the Bachelor in Bioengineering (Agricultural Sciences)

Final competences

1 *Knowing and controlling the basic principles of visual, near infrared and thermal sensors in agriculture and animal husbandry*
2 *Understanding and critically evaluating the applications of satellites, drones and tractor-based systems for crop monitoring*

3 *Executing the measurement and processing steps of UAV remote sensing in a practical application*
4 *Understanding the basic principle of GNSS systems. Critically reflecting on the application and limitations of GNSS technology in agriculture and crop husbandry*
5 *Explaining the principles of plant-based sensors and being able to process and interpret their data.*
6 *Knowing the main developments in sensor and monitoring systems in animal husbandry and being able to apply them in practice*
7 *Collecting field data, processing data according to the taught methods and critically analysing the results*
8 *Critically reporting of findings and executing practical courses in group.*

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, Seminar, Excursion, Lecture, Practical

Extra information on the teaching methods

Besides the plenary lectures, a series of practical classes is organized. The purpose of these practical classes is to make the students acquainted with the different monitoring options through the applications in a small measurement campaign.

Learning materials and price

Slides; Selected scientific literatur for each class; video recordings of selected parts of classes.

References

Course content-related study coaching

Through UFORA

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

Participation, Presentation, Peer and/or self assessment, Assignment

Possibilities of retake in case of permanent assessment

examination during the second examination period is possible in modified form

Extra information on the examination methods

Theory: oral exam with written preparation. Exercices (practica): written report per group, oral presentation

Calculation of the examination mark

Theory: periodic evaluation (60%); Practical courses: non-period evaluation (40%). Students with an insufficient dedication in the group activity or with an unmotivated absence in the excursions cannot earn their credits. When students do not participated in one or more evaluation moments, students cannot pass voor the course. In this course, the final score, if above 7/20, will be reduced to 7/20. If the students obtain a score of 8/20 or less for one of the evaluation assessments, students cannot pass for the entire course. If the final score would be 10/20 or higher, the final score is reduced to 9/20. Second examination is possible.