GHENT UNIVERSITY

Course Specifications

Valid in the academic year 2023-2024

Precision Agriculture (I002739)

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 2)	English	Gent

Lecturers in academic year 2023-2024

Mouazen, Abdul	LA20	lecturer-in-charge
De Smedt, Philippe	LA20	co-lecturer
Maes, Wouter	LA21	co-lecturer
Vancoillie, Frieke	LA20	co-lecturer

Offered in the following programmes in 2023-2024	crdts	offering
Master of Science in Bioscience Engineering: Agricultural Sciences	5	A
Exchange Programme in Bioscience Engineering: Agricultural Sciences (master's level)	5	A

Teaching languages

English

Keywords

Site specific management, GNSS, smart farming

Position of the course

Precision agriculture aims at improving the management of spatial and temporal variability within agricultural fields, by applying the right amount of farm input (fertilisers, water for irrigation, pesticides, seeds, tillage etc.) into the right place in the right time by using of the right technologies and practices. In crop production the scale of management of variability is down to within field or subfield scale.
The final target of precision agriculture is successful management of within field variability to maximise yield at reduced input cost, and reduced environmental impacts and waste. The final farm output is increased profit and farming production efficiency, whereas a reduced risk for pollution can be achieved by applying less agrochemicals into the environment (e.g., into soil, water and air).
The implementation of precision agriculture requires the combination of several technologies into an integrated agricultural management system. These technologies often include global positioning systems, geographical information systems, remote sensing of crop, proximal soil and crop sensing, yield monitoring, geostatistical modelling and mapping, decision support tool (PA software), and variable rate technologies.
This course aims at an interdisciplinary approach with activating work forms. The lecturer in charge takes up a coordinating role, whereby the different topics covered will be presented by specialists in the respective disciplines. The concrete contents will be adapted as a function of the foreknowledge of the students who select this optional course.

Contents

The different parts of this course are presented by topic-specific specialists.
1. General philosophy of precision agriculture (A. Mouazen).
2. Proximal soil sensing I – reflectance – gamma ray – electrochemical methods (A. Mouazen).
3. Proximal soil sensing II – electrical resistivity – electromagnetic – GPR (P. De Smedt).
4. Proximal soil sensing III – multi-sensor data fusion (A. Mouazen & P. De Smedt).
5. Remote sensing for crop monitoring – satellite, airborne and drones – image processing – Applications - Part 1 (W. Maes)
6. Remote sensing for crop monitoring – satellite, airborne and drones – image processing – Applications - Part 2 (F. Van Coillie & W. Maes)

7. Proximal crop sensing including yield sensors (A. Mouazen)
8. PA information technologies (GIS and GNSS techniques) (F. Van Coillie)
9. Variable rate technologies – VR pesticide, seeding, fertilisation (A. Mouazen)
10. Technical and environmental aspects of site specific management – VR fungi and insect control (P. Spanoghe).
11. Technical and environmental aspects of site specific management – VR weed control (B. De Cauwer).
12. PA and farm management / business models for PA innovations (X. Gellynck).

Initial competences

No specific prior knowledge is required for this course other than that obtained during the joint section Bachelor in Bio-engineering.

Final competences

1 Understand what precision agriculture is.
2 *Insight in the multidisciplinary nature of precision agriculture.*

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

Extra information on the teaching methods

The theoretical lessons are lectures supported with illustrations. The practical exercises are composed out of demonstrations and excursions with a visit to one or more farms applying precision agriculture. Interaction with the facilities offered by the Bayer chair in Forward Farming is foreseen.

Learning materials and price

Since this course is conceived as a combination of multiple expertises, its contents will be adapted to the foreknowledge of the students subscribing for it. So it is not intended to have a prior fixed course content and worked out course material.

References

Course content-related study coaching

Assessment moments

end-of-term and continuous assessment

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

Written assessment with open-ended questions, Assignment

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

Written assessment with open-ended questions

Examination methods in case of permanent assessment

Participation, Assignment

Possibilities of retake in case of permanent assessment

examination during the second examination period is not possible

Extra information on the examination methods

The exam will consist of a combination of questions from the diverse disciplines which are covered in this course, with a focus on the interdisciplinary nature of Precision Agriculture and the practical experiences gathered during the field trips and farm visits

Calculation of the examination mark

- End-of-term assessment: continuous assessment 75 % and 25 % continuous assessment.
- Students who eschew period aligned and/or non-period aligned evaluations for this course unit may be failed by the examiner.
- There are no additional conditions to pass or in the calculation of the end-of-term assessment