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 Specifications
Valid as from the academic year 2019-2020

Ecophysiology (I000867)

Course size (nominal values; actual values may depend on programme)
Credits 5.0  Study time 135 h  Contact hrs 60.0 h

Course offerings and teaching methods in academic year 2019-2020
A (semester 1)  Dutch  UGent  self-reliant study 6.25 h
activities
on campus lecture 25.0 h
practicum 17.5 h
guided self-study 3.75 h
fieldwork 3.75 h
on campus demonstration 3.75 h

Lecturers in academic year 2019-2020
Steppe, Kathy  LA21  lecturer-in-charge

Offered in the following programmes in 2019-2020
crdts offering
Master of Science in Bioscience Engineering: Agricultural Sciences 5 A

Teaching languages
Dutch

Keywords
Plant-water relations, sap flow, photosynthesis, respiration, climate change, drought stress, mechanistic models, ecophysiological instrumentation

Position of the course
This course gives a detailed survey of the different ecophysiological processes and approaches (experimental and modelling) allowing a better understanding of the dynamic interactions between plants and their environment. We will study in detail the plant-water relations and the dynamic water transport through plants, as well as growth, photosynthesis and respiration and this in relation with how environmental factors influence these processes. The final aim is to be able to correctly assess how plants, crops, trees and terrestrial ecosystems respond to climate changes and changes in the environment they inhabit. Examples from recent Climate Change literature will be discussed. Special attention also goes to the development of intelligent, plant-based control algorithms for irrigation and greenhouse climate. Practical training with appropriate instrumentation is organized for small groups.

Contents
Theory
1. Plant water relationships
1.1. Fundamental aspects: role of water in plants, water content and water potential
1.2. Water relations at cell and leaf level: turgor pressure, osmotic adjustment, stomatal regulation
1.3. Water relations at plant level: water movement in plants, daily dynamics, transpiration
1.4. Mechanistic models in ecophysiological research
1.5. Case studies (o.a. embolisme)
2. Photosynthesis and respiration
2.1. Leaf and chloroplast structure, pigments
2.2. Light and dark reactions of photosynthesis in C3, C4 and CAM plants
2.3. Effects of environmental factors on photosynthesis
2.4. Respiration

(Approved)
2.5. Case studies (o.a. phloem transport)
Exercises: technical notes on instrumentation and practical training
1. Pressure bomb and thermocouple psychrometer
2. Diffusion porometer
3. Stomatal characteristics (replica method)
4. Gas exchange systems for measurement of photosynthesis, respiration and transpiration
5. Measurement systems for chlorophyll fluorescence
6. Sap flow sensors and LVD-sensors
7. Development of vulnerability curves to drought-induced embolism

Initial competences
There are no specific requirements.

Final competences
1. To understand and explain all the processes that control the plant water relations, particularly the mechanisms involved and their influence on the equilibrium between water uptake and water loss
2. Insight in and assessment of the practical implications of the plant water relations

3. To link the plant water relations to knowledge on photosynthesis and growth for estimating the growth potential and resistance to abiotic stress conditions (e.g. drought, elevated temperatures and CO2 concentrations, ...)

4. To apply the ecophysiological instrumentation and to analyze and interpret the results

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
Guided self-study, on campus demonstration, on campus lecture, practicum, fieldwork, self-reliant study activities

Learning materials and price
A syllabus is available for theory, complemented with technical notes for the practical exercises in the laboratory. Cost: 15 EUR

References

Course content-related study coaching
Individual coaching is possible.

Evaluation methods
end-of-term evaluation and continuous assessment

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

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

Examination methods in case of permanent evaluation
Report
Possibilities of retake in case of permanent evaluation
examination during the second examination period is possible in modified form

Calculation of the examination mark

(Approved) 2
Theory exam: period evaluation (70%)
Practical exam: non-periodic evaluation (10%) and periodic evaluation (20%)
Students who eschew period aligned and/or non-period aligned evaluations for this course unit may be failed by the examinator.