GHENT UNIVERSITY

Course Specifications

Valid as from the academic year 2024-2025

Plant Physiology (0000111)

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

Credits 5.0 **Study time 125 h**

Course offerings and teaching methods in academic year 2024-2025

A (semester 2)	English	Incheon	lecture
			practical

Lecturers in academic year 2024-2025

Seo, Dong Hye	KR01	lecturer-in-charge

Offered in the following programmes in 2024-2025	**crdts**	**offering**
Bachelor of Science in Environmental Technology	5	A
Bachelor of Science in Food Technology	5	A
Bachelor of Science in Molecular Biotechnology	5	A

Teaching languages

English

Keywords

The plant cell wall, Plant water management and nutrition, Energy, Photomorphogenesis and flowering, Plant hormones, (a)biotic stress responses

Position of the course

This course will unveil some of the most enthralling mysteries of plant life and show the uniqueness of plants as a life form. The topics that are dealt with in this course will demonstrate how plants work and function, and highlight cellular and biochemical processes needed to complete a plant's life cycle, in function of an ever changing environment. The course focusses mainly on higher plants and tackles physiolocial processes from a holistic perspective, i.e. focusing on the interrelationship between all organs of the plant. Next to that, the relationship between the plant (function) and the abiotic environment are deepened out.

Contents

1. The plant cell wall (composition and function)
2. Water Management and nutrition:
- Water balance of the plant: Water potential and osmatic potential; Water balance of the plant (availability of water in the soil, water uptake by the root, upward water transport); Transpiration
- Mineral nutrition: Essential elements and nitrogen fixation and assimilation

3. Energy:
- Photosynthesis: Light-dependent reactions, photoprotection. Calvin Benson cycle reactions, photorespiration, C3/C4/CAM metabolism.
- Starch biosynthesis and degradation.

4. Photomorphogenesis and flowering:
- Phytochromes (molecular and spectral properties of phytochrome, localisation, signal transduction, physiological action of phytochrome)
- Blue light/UV-A photoreceptors
- UV-B photoreceptors
- Flowering: induction, photoperiodism, vernalisation

5. Plant hormones:
- Biosynthesis, transport, homeostasis and physiological effects of Auxins, Gibberellins, Cytokinins, Ethylene

6. Interactions with the environment

- biotic interactions: stress response and immunity: salicylic acid and jasmonic acid.
- abiotic stress response: Abscisic acid.

Initial competences

Basics of general biology, plant biology, biochemistry and molecular biology

Final competences

1 To know and understand the physiological processes in higher plants.
2 To understand the interaction of plants with its environment, and the adjustment of plant growth processes to a changing environment
3 To integrate the built of plants and the function of plants with the requirements needed for the completion of a plant's life cycle
4 To gain insight into the importance of plants as primary producers for a sustainable biobased-economy
5 To have acquired a solid basis for further specialized studies in plant developmental biology, plant biotechnology, plant production, molecular physiology etc.
6 To be able to understand, use and explain terminology in plant physiology to expert and laymans audiences.
7 To develop analytical and problem solving skills (through the lab exercises) and to be able to integrate experimental data with text-book knowledge
8 To appreciate the interdisciplinary character of plant physiology and to relate to cell biology, botany, molecular biology and molecular genetics

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, Practical

Extra information on the teaching methods

The lectures will deal with the topics and concepts mentioned above, and the practical course will form an integrated part by putting theory into practice and expanding these topics via well-chosen experimental set-ups.

Study material

Type: Syllabus

Name: Syllabus
Indicative price: Free or paid by faculty
Optional: no
Available on Ufora : Yes

Additional information: Lecture slides, exercise slides as well as a syllabus (both in pdf format) are made available to the students through Ufora.

Type: Slides

Name: Slides
Indicative price: Free or paid by faculty
Optional: no
Available on Ufora : Yes

Additional information: Lecture slides, exercise slides as well as a syllabus (both in pdf format) are made available to the students through Ufora.

References

Plant Physiology [Hardcover], Lincoln Taiz (Author), Eduardo Zeiger (Author)

Course content-related study coaching

Weekly office hours, during which the student can pass by for more information, will be anounced at the beginning of the course.
Feedback during permanent evaluation moments will be given.
The course will end with a Q&A session (1-2 hrs) during which students can ask for explanation of certain topics.

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

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 understanding of physiology of higher plants will be assessed via open questions and figure questions in which the emphasis will be to explain broad concepts in terms of intrinsic plant development and growth as well as in terms of the relationship with the environment.

Calculation of the examination mark

Periodic evaluation = 16/20; non-periodic evaluation = 4/20
Students need to attend the practical sessions in order to pass the course.
The non-periodic evaluation will consist out of an assignment in group (one page summary), as well as lab session participation and final report.
Students who eschew non-period aligned evaluations for this course unit may be failed by the examiner.