

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

Credits	5.0	Study time	125 h	Contact hrs	50.0 h
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Course offerings and teaching methods in academic year 2019-2020

A (semester 2)	English	practicum	24.0 h
		lecture	25.0 h
		demonstration	1.0 h

Lecturers in academic year 2019-2020

Depuydt, Stephen	KR01	lecturer-in-charge
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Offered in the following programmes in 2019-2020

<a href="#">Bachelor of Science in Molecular Biotechnology</a>	crdts	offering
	5	A

Teaching languages

English

Keywords

The plant cell and the plant cell wall, Plant water management and nutrition, Photosynthesis, Respiration, Photomorphogenesis and flowering, Plant hormones

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 physiological 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. Functional aspects of the plant cell:
  - endomembrane system,
  - the plasmamembrane
  - the cell wall (composition and function)
2. Water Management and nutrition:
  - Water balance of the plant: Water potential and osmotic 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. Photosynthesis and Respiration:
  - chloroplast: structure and function, light dependent reactions, Calvin Benson cycle reactions
  - Respiration and photorespiration
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
  - Flower induction: Floral evocation, Photoperiodism, Vernalisation
5. Plant hormones:
  - biosynthesis, transport, homeostasis and physiological effects of Auxins, Gibberellins, Cytokinins, Ethylene, Abscisic acid, Brassinosteroids, Jasmonic Acid, Salicylic Acid and Strigolactones.

## 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

Demonstration, lecture, practicum

## 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.

## Learning materials and price

Written syllabus and handouts of the PowerPoint slides will be provided. Syllabus of the practical exercises will be available.

## 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 announced 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.

## Evaluation methods

end-of-term evaluation and continuous assessment

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

Written examination with open questions

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

Written examination with open questions

## Examination methods in case of permanent evaluation

Participation, report

## Possibilities of retake in case of permanent evaluation

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.*

*Students who eschew non-period aligned evaluations for this course unit may be failed by the examiner.*