

Advanced Plant Cell Biology and Signaling (C004006)

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

Credits	3.0	Study time	80 h	Contact hrs	25.0 h
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Course offerings and teaching methods in academic year 2018-2019

A (semester 1)	English	lecture	2.5 h
		seminar	22.5 h

Lecturers in academic year 2018-2019

De Rybel, Bert	WE09	lecturer-in-charge
Van Damme, Daniël	WE09	co-lecturer

Offered in the following programmes in 2018-2019

Master of Science in Biochemistry and Biotechnology	crdts	offering
	3	A

Teaching languages

English

Keywords

Plant cell biology, endocytosis, endomembrane trafficking, ligand-dependent receptor internalization, peptide and kinase signalling, protein-protein interactions, calcium signalling, miRNA signalling, protein movement and cell patterning mechanisms.

Position of the course

This course offers students the opportunity to broaden their knowledge in grand concepts of cell biology and signal transduction cascades in plants and is thus a logical continuation of the courses: General Cell Biology, Molecular Cell Biology, Developmental Biology, Molecular Biology of Plants etc. Although these courses give a necessary overview, the goal of Advanced cell biology and signalling in plants is to further explore these mechanisms, to discuss these in detail and to compare them with each other. Possible applications and usefulness in general of diverse technologies can be illustrated and the value of these technologies can be further explored.

Contents

In this course, we focus on four major signalling mechanisms in plant cell biology and developmental biology. These serve as case studies of how plants are capable of transducing signals in diverse ways. Although these are each very specific for a certain process, they can serve as perfect examples of more general concepts in growth and development of all life on earth.

1. Receptor signalling attenuation by endocytosis (including cell biology, membrane trafficking and nutrient uptake mechanisms)
2. Intracellular calcium signalling (including endomembrane trafficking and signal transduction pathways)
3. Peptide and kinase mediated signalling (including structural biology, protein-protein and protein-peptide interactions)
4. Mobile protein and miRNA signals during cell patterning in development (including miRNA and protein movement mechanisms, protein-protein interactions, transcription factor activity and cell patterning)

Initial competences

Basic knowledge of: developmental biology, genetics, molecular biology and cell biology (successfully completed these courses in Bachelor Biochemistry and Biotechnology), and successful completion of the course The plant Cell in the Master of Science in Biochemistry and Biotechnology.

Final competences

- 1 Judge, process and present research for its relevance and scientific value.
- 2 Evaluate standard research methodologies for their usefulness, relevance and applicability.
- 3 Obtain a deeper understanding of research strategies and processing scientific results and their consequences.

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, seminar

Extra information on the teaching methods

After an introductory lecture to frame the course itself, the students will be given a general introduction for about 30 minutes covering one of the four major concepts covered in this course. This lecture serves to orient the students in the study topic and to place this in a known molecular network or developmental process. The students then each get one scientific article to read at home that covers one specific aspect. In a following lecture, the students are asked to present this article to the fellow students. After this presentation, the lecturer discusses the newly acquired insights with the students. Techniques are further examined and conclusions are debated. Also, alternative hypotheses are generated and considered. Finally, we will discuss how this type of research can be continued, which experiments would be required and how possible outcomes could be interpreted. Based on the diverse cell biological and signal transduction mechanisms covered in this course; the students can broaden their insights into these processes, but at the same time are allowed to extend their understanding of scientific research methodologies and approach scientific literature in a critical way. In conclusion: this course will help students greatly during their literature study of their master thesis and offers support on the rationale of performing scientific research itself.

Learning materials and price

Notes and illustrations are available via Minerva.
Other costs: 10 EUR.

References

Recent articles.

Course content-related study coaching

Coaching is available through interactive support via email or personal guidance.

Evaluation methods

continuous assessment

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

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

Examination methods in case of permanent evaluation

Oral examination, participation, report

Possibilities of retake in case of permanent evaluation

not applicable

Extra information on the examination methods

Students are tested during each subsection for their acquired knowledge, capacity to interpret scientific data and presenting this in a clear and comprehensive way, motivation and input. This will result in a score for each of the four subsections of this course.

Calculation of the examination mark

The end score is the average of the obtained scores for each of these topics: grades based on motivation and input during discussions (6/20), oral presentations (8/20), reports and knowledge during lectures and seminars (6/20). These scores are given for each of the four subsections on a permanent basis during the course.