

Plant Growth and Development (C003099)

Course size (nominal values; actual values may depend on programme)
 Credits 3.0 Study time 80 h Contact hrs 25.0 h

Course offerings and teaching methods in academic year 2018-2019

A (semester 2)	English	lecture	15.0 h
		seminar	10.0 h

Lecturers in academic year 2018-2019

Beeckman, Tom	WE09	lecturer-in-charge
Nowack, Moritz	WE09	co-lecturer

Offered in the following programmes in 2018-2019

	crdts	offering
Master of Science in Bioinformatics (main subject Systems Biology)	3	A
Master of Science in Biochemistry and Biotechnology	3	A
Master of Science in Plant Biotechnology	3	A
Exchange programme in Biochemistry and Biotechnology (master's level)	3	A
Exchange Programme in Bioinformatics (master's level)	3	A

Teaching languages

English

Keywords

Meristems, stem cells, cell identity, pattern formation, asymmetric cell division, lateral inhibition, chromatin modification, imprinting, miRNA, architecture.

Position of the course

This course is based on the part Plant developmental biology of the course Developmental biology of the 3rd Bachelor Biochemistry and Biotechnology. It will provide deeper insight into important terminology such as stem cells and pattern formation. In addition it will introduce and extend on novel important trends in developmental biology such as chromatin and miRNA mediated gene expression regulation and its consequence on developmental processes. this course contributes to following program competences: Ma.WE.BB.1.1, Ma.WE.BB.2.2, Ma.WE.BB.3.3, Ma.WE.BB.4.1, Ma.WE.BB.5.1, Ma.WE.BB.6.5, Ma.WE.BB.7.RES.

Contents

Stem cell (2 lessons)

- Definitions (stem cell, stem cell niche, ..)
- apical root meristem, genetic factors controlling stem cell identity
- role of auxin transport and accumulation in stem cell maintenance
- RBR-mediated regulation of stem cell status
- Vegetative apical meristem and genetic factors
- molecular control of initiation of lateral organs
- auxin transport and organogenesis

Architecture (3 lessons)

- Branching of the vegetative plant body
- Branching of the stem: axillary meristems, hormones and genetic control
- Branching of the root: cell cycle status of the pericycle, polar auxin transport

Chromatin and development (4 lessons)

- Chromatin structure, remodeling and modifying complexes
- Molecular components of imprinting

- Examples of chromatin-mediated regulation of plant development (flowering, growth)

miRNA mediated regulation of plant development (1 lesson)

- Components of the miRNA pathway in plants
- Examples of developmental genes that are regulated by miRNA

Pattern formation (2 lessons)

- Asymmetric cell division and lateral inhibition
- Pattern formation in axis, tissue or cell type formation

Initial competences

Succeeded in the courses Developmental Biology, Genetics, Molecular Biology and Cell Biology of the Bachelor Biochemistry and Biotechnology.

Final competences

- 1 Acquire the ability to judge the value of research results.
- 2 Be able to apply standard research methods and know their relevance, resolution and applicability.

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

Excursion, lecture, seminar

Extra information on the teaching methods

Following information applies to the students of the "Master of Science in Plant Biotechnology" and "Master of Science in Biochemistry and Biotechnology - Major/minor Plant Biotechnology": For the academic year 2018-2019, the seminars for the courses "Plant Biotic Interactions"(C003097)," The Plant Cell"(C003098) and "Plant Growth and Development "(C003099) are planned to be organized together. For this, two visits are planned at the Max Planck Institute for Plant Breeding Research and the Jülich Plant Phenotyping Centre (JPPC) in Germany. The students will be given a research question in advance, for which they must formulate an answer during the visits. (This is subjected to the practical realization of the visits).

Learning materials and price

Slides via Minerva

Estimated cost: 10 EUR

References

Mechanisms of plant development (2003), Leyser & Day, and a few up to date review papers.

Course content-related study coaching

Interactive support via email.

Evaluation methods

end-of-term evaluation

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

Possibilities of retake in case of permanent evaluation

not applicable

Extra information on the examination methods

Oral examination with written preparation.

Calculation of the examination mark

Marks of exam.