

Plant Biotechnology (O000145)

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

Credits 4.0 Study time 108 h Contact hrs 48.0 h

Course offerings and teaching methods in academic year 2019-2020

A (semester 2)	English	seminar: practical PC	4.0 h
		room classes	
		microteaching	3.0 h
		lecture	20.0 h
		practicum	12.0 h
		group work	9.0 h

Lecturers in academic year 2019-2020

Gheysen, Godelieve LA25 lecturer-in-charge

Offered in the following programmes in 2019-2020

Bachelor of Science in Molecular Biotechnology	crdts	offering
	4	A

Teaching languages

English

Keywords

plant transformation, transgenesis & cisgenesis, gene silencing, gene editing, applications of transgenic plants, legislation, ethical aspects

Position of the course

This course is an introduction to plant biotechnology. The student will become familiar with different techniques used for plant transformation. Several case studies will be discussed with the focus on regulation, usefulness, risk analysis, societal aspects, etc.

Contents

- I. Plant transformation
 - I.1. Plant transformation and regeneration: the basis
 - I.2. Agrobacterium mediated plant transformation
 - I.3. Direct Gene Transfer (DGT) methods
 - I.4. Expression of transgenes in plants
 - I.5. Inactivation of plant genes
 - I.6. New breeding technologies
 - I.7. Safety assessment
- II. Applications
 - II.1. Herbicide resistance
 - II.2. Insect resistance
 - II.3. Disease resistance & tolerance to abiotic stress
 - II.4. Yield and quality
 - II.5. Non-food & pharming
 - II.6. GMO regulations and discussions

Lab exercises: Transformation of rice. CRISPR gene editing. Bioinformatics PC-exercises. Group work and presentations.

Initial competences

Knowledge of biochemistry, molecular biology, and plant biology

Final competences

- 1 is aware of different possible techniques to improve plants: breeding, mutagenesis, transgenesis, cisgenesis, genome editing and other new breeding techniques...
- 2 distinguishes the different applications of GMOs in agriculture and describes the

- commercially available products
- 3 substantiates the possibilities of using plants for the production of enzymes, fine chemicals, pharmaceuticals, etc.
- 4 explains the definitions of GMO, event, etc. especially in a regulatory context
- 5 discusses the regulatory steps needed before GMO commercialisation
- 6 critically evaluates scientific papers on GMOs including safety studies
- 7 knows and critically compares transformation technologies for the development of improved plants
- 8 is aware of how to assess, risks and benefits of specific GMO applications
- 9 collects and critically analyzes data from scientific papers and makes a scientifically valid summary
- 10 discusses genetic engineering applications with scientific arguments and in a multidisciplinary context
- 11 assesses new scientific developments on genetic engineering and applications in a scientific and socio-economic context
- 12 adopts a positive attitude towards independent and life long learning
- 13 communicates in English via oral presentation
- 14 appreciates the public opinion and the GMO discussion
- 15 formulates, based on scientific data, a personal opinion on GMO applications without disrespect for a different opinion of others
- 16 collects and critically analyzes massive amounts of often contradictory web based information and integrates this with scientific data to come to a scientifically sound conclusion

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

Group work, lecture, microteaching, practicum, seminar: practical PC room classes

Extra information on the teaching methods

lectures 20 hrs
 practicals 12 hrs
 PC practicals 4 hrs
 microteaching 3 hrs
 group work 9 hrs

Learning materials and price

A compact syllabus is available. Powerpoint presentations and movies explaining basic principles are available on Minerva.

References

Plant Biotechnology. The genetic manipulation of plants. Slater, Scott and Fowler, 2nd edition. Oxford University Press

Course content-related study coaching

Extra information and explanation can be obtained through e-mail, personal contact or Minerva

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, assignment, peer assessment, 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

The evaluation of the theory counts for 3/4, the permanent evaluation of the exercises, microteaching and participation to discussions for 1/4.