GHENT UNIVERSITY

Course Specifications

Valid as from the academic year 2025-2026

Plant Biotechnology (0000145)

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

Credits 4.0 **Study time 108 h**

Course offerings and teaching methods in academic year 2025-2026

A (semester 2)	English	Incheon	lecture
			group work
			practical
			seminar
			peer teaching

Lecturers in academic year 2025-2026

Pauwels, Laurens	LA25	lecturer-in-charge

Offered in the following programmes in 2025-2026	**crdts**	**offering**
Bachelor of Science in Biochemistry and Biotechnology	4	A
Bachelor of Science in Molecular Biotechnology	4	A

Teaching languages

English

Keywords

plant transformation, transgenesis & cisgenesis, gene silencing, CRISPR/Cas9 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 basics
I.2. Agrobacterium-mediated plant transformation
I.3. Alternative transformation methods
I.4. Expression of transgenes in plants
I.5. Inactivation of plant genes
I.6. New genomic techniques

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

III. GMO regulations and discussions
Lab excercises: Transformation of Arabidopsis using floral dip, protoplast transformation and analysis of gene expression using a GUS reporter, bioinformatics-excercises.
Group work and presentations.: A group of 4 students searches for information on a specific topic, which is then presented for and discussed and evaluated by the

whole group.This process also uses peer evaluation.

Initial competences

This course unit builds on certain course competencies/learning outcomes of courses on molecular biology, plant biology and genetics

Final competences

1 Explain different techniques to improve plants: breeding, mutagenesis, transgenesis, cisgenesis, genome editing and other new genomic techniques.
2 Demonstrate practical insight in the different steps for the generation of transgenic and gene edited steps
3 Interpret scientific reports on the molecular characterization of transgenic events and gene edits
4 Distinguish the different applications of plant biotechnology in agriculture and be aware of commercially available products.
5 Substantiate the possibilites of using plants for the production of enzymes, fine chemicals, and pharmaceuticals.
6 Know how to assess, risks and benefits of specific GMO applications.
7 Be able to explain the definitions of GMO, event, etc., especially in a regulatory context.
8 Clarify the regulatory steps needed before GMO commercialisation.
9 Discuss genetic engineering applications with scientific arguments and in a multidisciplinary context.
10 Assess the applicability of new scientific developments in genetic engineering in a scientific and socio-economic context.
11 Discuss on genetic engineering applications with scientific arguments and in a multidisciplinary context
12 Orally present, based on scientific data, a personal opinion on GMO plant biotechnology applications without disrespect for a different opinion of others
13 Appreciate different opinions related to GMOs and NGTs in the public debate

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, Seminar, Lecture, Practical, Peer teaching

Extra information on the teaching methods

lectures 20 hrs
practicals 12 hrs
PC practicals 4 hrs
peer teaching 6 hrs
group work 6 hrs

Study material

Type: Syllabus

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

Additional information: A compact syllabus is available.

Type: Slides

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

Additional information: Powerpoint presentations and movies explaining basic principles are available on Ufora.

References

Course content-related study coaching

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

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, Peer and/or self assessment, Assignment

Possibilities of retake in case of permanent assessment

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 excercises, peer teaching and participation to discussions for 1/4.