GHENT UNIVERSITY

Course Specifications

Valid as from the academic year 2025-2026

Plant Biotechnology (I002611)

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

Credits 5.0 **Study time 150 h**

Course offerings and teaching methods in academic year 2025-2026

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

Lecturers in academic year 2025-2026

Bauters, Lander	LA25	staff member
Pauwels, Laurens	LA25	lecturer-in-charge

Offered in the following programmes in 2025-2026	crdts	offering
Master of Science in Bioinformatics(main subject Bioscience Engineering)	5	A
International Master of Science in Agro- and Environmental Nematology	5	A
Master of Science in Biochemical Engineering Technology	5	A
Master of Science in Bioscience Engineering: Cell and Gene Biotechnology	5	A
Exchange Programme in Bioinformatics (master's level)	5	A
Exchange Programme in Bioscience Engineering: Agricultural Sciences (master's level)	5	A
Exchange Programme in Bioscience Engineering: Cell and Gene Biotechnology (master's level)	5	A

Teaching languages

English

Keywords

Plant transformation, plant regeneration, CRISPR/Cas9 gene editing, applications of plant biotechnology, legislation, societal and ethical aspects

Position of the course

The student will become familiar with different techniques used for plant transformation and gene editing. Several case studies will be discussed with the focus on regulation, usefulness, risk analysis, social 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 in plant breeding

II. Applications
II.1. Herbicide resistance
II.2. Insect resistance
II.3. Virus biology and resistance
II.4. Disease resistance & tolerance to abiotic stress
II.5. Yield and quality

III. GMO regulations and discussions
Lab excercises: DNA analysis of transgenic plants, transient transformation. PC-practicals. Group work and presentations.

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, and new genomic technique
2 Demonstrate practical insight in the different steps for the generation of transgenic and gene edited plants
3 Interpret scientific reports on the molecular characterization of transgenic events and gene edits
4 Distinguish the different applications of biotechnology in agriculture and is aware of GMO and gene edited products that are commercially available
5 Substantiate the possibilities of using plants for the production of enzymes, fine chemicals, and pharmaceuticals
6 Assess risks and benefits of specific GMO applications
7 Explain the definitions of GMO, event, etc., especially in a regulatory context
8 Clarify the regulatory steps needed before GMO commercialisation
9 Assess the applicability of new scientific developments in genetic engineering in a scientific and socio-economic context
10 Discuss on genetic engineering applications with scientific arguments and in a multidisciplinary context
11 Orally present, based on scientific data, a personal opinion on plant biotechnology applications without disrespect for a different opinion of others
12 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

Besides the lectures, several aspects of plant biotechnology applications and the public debate are being discussed in class. During the microteaching each 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.

Study material

Type: Syllabus

Name: Plant Biotechnology
Indicative price: € 3
Optional: no
Number of Pages : 50
Available on Ufora : Yes
Available through Student Association : Yes

Type: Slides

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

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

Oral assessment, Written assessment with open-ended questions

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

Oral assessment, 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 not possible

Calculation of the examination mark

The evaluation of the theory counts for 3/4, the permanent evaluation of the excercises, microteaching and participation for 1/4.
The permanent evaluation score of the first exam session stays valid for the resit.
Students who eschew periodic and/or permanent evaluations for this course unit may be failed by the examiner. The score is then max. 8/20.