

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 2026-2027

A (semester 2)

English

Gent

group work

practical

peer teaching

seminar

lecture

Lecturers in academic year 2026-2027

Pauwels, Laurens

LA25

lecturer-in-charge

Bauters, Lander

LA25

staff member

Offered in the following programmes in 2026-2027

[Master of Science in Bioinformatics\(main subject Bioscience Engineering\)](#)

crdts 5

offering A

[Master of Science in Bioinformatics\(main subject Systems Biology\)](#)

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 exercises: 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 exercises, microteaching and participation for 1/4.

The permanent evaluation score of the first exam session stays valid for the resit. Students who eschew one or more parts of the assessment can no longer obtain a pass mark for the course unit. Should the final mark be higher than 10/20, it will be reduced to the highest non-tolerable mark (i.e. 7/20).