

## Plant Biotechnology (I002611)

Due to Covid 19, the education and evaluation methods may vary from the information displayed in the schedules and course details. Any changes will be communicated on Ufora.

<b>Course size</b>	<i>(nominal values; actual values may depend on programme)</i>		
<b>Credits</b> 5.0	<b>Study time</b> 150 h	<b>Contact hrs</b>	50.0 h

### Course offerings and teaching methods in academic year 2020-2021

A (semester 2)	English	Gent	group work	1.25 h
			seminar: practical PC room classes	3.75 h
			lecture	30.0 h
			lecture: plenary exercises	1.25 h
			microteaching	8.75 h
			practicum	5.0 h

### Lecturers in academic year 2020-2021

Gheysen, Godelieve	LA25	lecturer-in-charge
Höfte, Monica	LA21	co-lecturer

### Offered in the following programmes in 2020-2021

	crdts	offering
<a href="#">Master of Science in Bioinformatics (main subject Bioscience Engineering)</a>	5	A
<a href="#">International Master of Science in Agro- and Environmental Nematology</a>	5	A
<a href="#">Master of Science in Bioscience Engineering: Cell and Gene Biotechnology</a>	5	A
<a href="#">Exchange Programme in Bioinformatics (master's level)</a>	5	A
<a href="#">Exchange Programme in Bioscience Engineering: Agricultural Sciences (master's level)</a>	5	A
<a href="#">Exchange Programme in Bioscience Engineering: Cell and Gene Biotechnology (master's level)</a>	5	A

### Teaching languages

English

### Keywords

Plant transformation, applications of transgenic plants, legislation, societal and ethical aspects

### Position of the course

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, social 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 techniques
  - I.7. Safety
- 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
  - II.6. Non-food & pharming
  - II.7. GMO regulations and discussions
- Lab exercises: DNA analysis of transgenic plants, transient transformation. PC-practicals. Group work and presentations.

### Initial competences

Knowledge of biochemistry, molecular biology, and plant biology

### Final competences

- 1 being aware of different possible techniques to improve plants: breeding, mutagenesis, transgenesis, cisgenesis, new breeding technologies...
- 2 distinguish the different applications of GMOs in agriculture and be aware of the commercially available products
- 3 substantiate the possibilities of using plants for the production of enzymes, fine chemicals, pharmaceuticals, etc.
- 4 understand the definitions of GMO, event, etc. especially in a regulatory context
- 5 discuss the regulatory steps needed before GMO commercialisation
- 6 critically evaluate scientific papers on GMOs including safety studies
- 7 compare transformation technologies for the development of improved plants
- 8 assess risks and benefits of specific GMO applications
- 9 discuss on genetic engineering applications with scientific arguments and in a multidisciplinary context
- 10 assess new scientific developments on genetic engineering and applications in a scientific and socio-economic context
- 11 adopt a positive attitude towards independent and life long learning
- 12 have good social and communicative skills to function in a team
- 13 appreciate the public opinion and the GMO discussion
- 14 formulate, based on scientific data, a personal opinion on GMO applications without disrespect for a different opinion of others
- 15 critically analyse massive amounts of often contradictory web based information and integrate 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, lecture: plenary exercises, seminar: practical PC room classes

### Extra information on the teaching methods

Besides the lectures, several aspects of GMO applications and the public GM debate are being discussed in class and on the online forum. 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.

### Learning materials and price

A compact syllabus is available. 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

### 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, oral examination

### Examination methods in case of periodic evaluation during the second examination period

Written examination with open questions, oral examination

**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 not possible

**Calculation of the examination mark**

The evaluation of the theory counts for  $\frac{3}{4}$ , the permanent evaluation of the exercises, microteaching and participation for  $\frac{1}{4}$ .

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.