

## Plant Research Technologies (C003104)

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.

Course size (nominal values; actual values may depend on programme)  
Credits 3.0 Study time 75 h Contact hrs 25.0 h

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

A (semester 1)	English	Gent	lecture	15.0 h
			seminar: coached	10.0 h
			exercises	
			online lecture	0.0 h
			online lecture: plenary	0.0 h
			exercises	

### Lecturers in academic year 2020-2021

Nelissen, Hilde WE09 lecturer-in-charge

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

	crdts	offering
<a href="#">Master of Science in Bioinformatics (main subject Systems Biology)</a>	3	A
<a href="#">Master of Science in Plant Biotechnology</a>	3	A

### Teaching languages

English

### Keywords

Transgenic plants, transgene expression, transgene silencing methods, transgene characterisation, vector design, reverse genetics resources, targeted mutagenesis, new cloning techniques and gene synthesis, genome engineering, molecular analysis of plant DNA, RNA and proteins.

### Position of the course

The course presents the most commonly used methods to investigate gene function by the introduction of genetic perturbations into plant genomes and the analysis of the resulting phenotypes. The aim of the course is to prepare students for research of plant biology topics in an academic or industrial environment.

Competence codes: Ma.WE.BB.1.1; Ma.WE.BB.1.2; Ma.WE.BB.1.4; Ma.WE.BB.1.5; Ma.WE.BB.2.1; Ma.WE.BB.2.4; Ma.WE.BB.2.6; Ma.WE.BB.3.2; Ma.WE.BB.3.4; Ma.WE.BB.4.3; Ma.WE.BB.5.1; Ma.WE.BB.6.1; Ma.WE.BB.6.4; Ma.WE.BB.7.RES.1; Ma.WE.BB.7.RES.2.

### Contents

1. Historic view on plant transformation
2. Transgene structure: capturing the functional elements for in planta expression (promoters, terminators,...)
3. Plant transformation of Arabidopsis and non-model plants: transformation methods, T-DNA integration, site specific integration, targeted integration
4. Vector design: classic/ gateway, selectable markers, screenable markers, marker-free technology
5. Transgenic plant characterisation: locus number, copy number, transgene expression, GMO detection and quantification
6. New developments in genome engineering and plant transformation technologies

To elucidate and apply the theory, the lectures will be alternated with practical exercises which will be addressed by interactive discussions.

### Initial competences

Previous education in the life sciences equivalent with the level of Bachelor of Science

in Biochemistry and Biotechnology, specifically good knowledge of molecular genetics, molecular plant biology, and gene technology.

#### Final competences

- 1 The student understands the principles and concepts of plant biotechnology and is acquainted with the methodology used in the field.
- 2 The student is able to apply the plant research technology methods in research and to evaluate new applications.
- 3 The student is familiar with the techniques that are standardly used in plant research for functional gene analysis.
- 4 The student is familiar with technologies to make, detect, analyze and characterize transgenic and genome-edited plants.
- 5 The student is acquainted with the possibilities and limitations of the techniques and can implement the necessary controls to properly interpret the data.

#### 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

Lecture, lecture: plenary exercises, seminar: coached exercises, online lecture, online lecture: plenary exercises

#### Extra information on the teaching methods

The content of the course is thought in 12 sessions by slide presentations which are accessible for the student on Ufora.

The workshops consist of research related exercises.

#### Learning materials and price

The slide presentations will be available online via Ufora. Articles, schemes and figures illustrating the different topics will be provided.

#### References

#### Course content-related study coaching

Besides the lectures, the student has the opportunity to ask questions to the lecturer, through Ufora, e-mail or a personal appointment. During the practical courses and seminars, several aspects of the course are further discussed and illustrated.

#### Evaluation methods

continuous assessment

Examination methods in case of periodic evaluation during the first examination period

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

Examination methods in case of permanent evaluation

Written examination with open questions

Possibilities of retake in case of permanent evaluation

examination during the second examination period is possible

Calculation of the examination mark

100% written exam