GHENT UNIVERSITY

Course Specifications

Valid as from the academic year 2025-2026

Molecular Plant Breeding (I002628)

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 1)	English	Gent	lecture
			excursion

Lecturers in academic year 2025-2026

Maenhout, Steven	LA21	lecturer-in-charge

Offered in the following programmes in 2025-2026	**crdts**	**offering**
Master of Science in Bioscience Engineering: Cell and Gene Biotechnology	5	A
Exchange Programme in Bioscience Engineering: Cell and Gene Biotechnology (master's level)	5	A

Teaching languages

English

Keywords

Variety breeding, hybrids, synthetic varieties, resistance breeding, plant breeders' rights, marker-assisted selection (MAS), breeding value estimation, molecular markers, linkage mapping, quantitative trait locus (QTL), genome-wide association, genomic selection

Position of the course

Plant breeding is an ancient discipline that creates new genotypes adapted to specific growing conditions (e.g. abiotic and biotic stress), crop management techniques (e.g. mechanization, one-time harvest) and that addresses consumers and society requirements (e.g. food processing, nutritional value, etc.). With the advent of molecular genetics and genomics, the array of tools and methods has drastically expanded making the plant breeding process more efficient. Moreover, molecular genetics creates the possibility to introduce new characteristics. This course begins with an introduction to the basics of plant breeding (creating diversity and selection methods), which is a prerequisite to understand and implement molecular tools in plant breeding programs. The second part of the course will address techniques that rely on molecular markers to increase selection efficiency.

Contents

1 Introduction: historical evolution, impact of plant breeding
2 Multiple trait selection
3 Biology of plant reproduction systems
4 Hybrid breeding
5 Backcrosses and marker assisted backcrossing
6 Breeding open-pollinated crops
7 Breeding self-pollinating crops
8 Plant breeders' rights
9 Breeding Value Estimation
10 Molecular markers
10 Linkage mapping and GWAS
11 Genomic Selection
12 Guest lectures, visits to research institutes and plant breeding companies.

Initial competences

Knowledge of plant physiology, crop husbandry, applied genetics and statistics

Final competences

1 analyse plant reproductive systems, breeding programmes, selection strategies, breeding methods, techniques and schemes
2 have knowledge of DNA-marker technologies used in pLant breeding
3 have insight into 'marker-assisted selection' and 'genomic selection'
4 analyse and interpret scientific literature in the field of plant breeding

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

Excursion, Lecture, Independent work

Study material

Type: Syllabus

Name: Syllabus
Indicative price: € 20
Optional: yes
Number of Pages : 381
Oldest Usable Edition : 2024
Available on Ufora : No
Online Available : No
Available in the Library : No
Available through Student Association : Yes

Type: Slides

Name: Slides
Indicative price: Free or paid by faculty
Optional: no
Number of Slides : 500
Available on Ufora : Yes
Online Available : No
Available in the Library : No
Available through Student Association : No
Additional information: free or paid by faculty

References

Various informative journal articles, books and research results.

Course content-related study coaching

The knowledge transfer is based on a no-nonsense long standing experience in plant breeding and variety development

Assessment moments

end-of-term and continuous assessment

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

Oral assessment

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

Oral assessment

Examination methods in case of permanent assessment

Participation, Assignment

Possibilities of retake in case of permanent assessment

examination during the second examination period is not possible

Extra information on the examination methods

Participation to activities with a permanent evaluation, such as excursions and practical sessions, is compulsory. Students demonstrating insufficient dedication regarding these activities and/or unmotivated absence are not eligible to receive credits for this course.

Calculation of the examination mark

Weight distribution of the final score:

- oral exam: 75%;
- task: 15%
- participation in and reporting on excursions: 10%