

## Functional Plant Biology (I002630)

**Cursusomvang** *(nominale waarden; effectieve waarden kunnen verschillen per opleiding)*

**Studiepunten 4.0** **Studietijd 120 u**

**Aanbodsessies in academiejaar 2023-2024**

A (semester 2) Engels Gent

**Lesgevers in academiejaar 2023-2024**

Geelen, Danny LA21 Verantwoordelijk lesgever

**Aangeboden in onderstaande opleidingen in 2023-2024**

	stptn	aanbodsessie
<a href="#">Master of Science in Bioscience Engineering: Cell and Gene Biotechnology</a>	4	A
<a href="#">Uitwisselingsprogramma bio-ingenieurswetenschappen: cel- en genbiotechnologie (niveau master-na-bachelor)</a>	4	A
<a href="#">Uitwisselingsprogramma bio-ingenieurswetenschappen: landbouwkunde (niveau master-na-bachelor)</a>	4	A

**Onderwijstalen**

Engels

**Trefwoorden**

Protein function, biochemical pathways, cell structure and function, gene expression, hormone signaling and process regulation, plant molecular biology, genetic engineering,

**Situering**

This course will present recent developments and insight into the molecular and physiological aspects of plant processes that control agriculturally important plant traits such as flowering, seed formation, plant architecture and size, cell growth, and biomass production. The course will provide insight into molecular aspects of plant specific processes that are relevant for growth and development and the plant's response to the changing environment and the occurrence of microbiota, pathogens and adverse climate conditions. To gain insight into the mechanisms involved in plant growth and development, and how it responds to the environment, one has to integrate knowledge on biochemistry, genetics, physiology, morphology etc. This will be attempted by presenting recent reports on scientific breakthroughs in specific research topics. The plant is observed as a factory that converts carbon dioxide into carbohydrates, protein and lipids and a wide range of secondary metabolites at the expense of light energy. These processes depend on the function and activity of proteins, other bioactive molecules such as RNA, and co-factors. This will be achieved by reading and discussing research papers reporting on recent knowledge and insight into a specific process or function. The topics will be chosen depending on what is currently a hot topic and research questions that are important in functional plant biology.

**Inhoud**

The course consists of topical lectures on case studies that presents and discusses key papers reporting on major advancements in plant biology and plant biotechnology.

1. Plant gene and protein function, classes of enzymes, gene annotation, ...
2. Regulation of gene and protein function (different levels of regulatory mechanisms)
3. Metabolic pathways and synthetic biology
4. Cell-cell signaling, long distance communication, hormone signaling and cross talk.
5. Integration and interpretation of various large molecular datasets.

As scientific advancement currently depends on the integration of experimental data from various disciplines, this methodology and approach will be conveyed to the student by exemplary publications and reviews. Diverse plant processes are suitable to illustrate the integration of datasets and results. In addition to plant processes, also examples of plant engineering, plant synthetic biology and emerging technology addressing the function of genes,

proteins and other molecules will be addressed.

### **Begincompetenties**

Basis knowledge of plant biochemistry, plant physiology, plant genetics, and molecular biology

### **Eindcompetenties**

- 1 read scientific publications in the field of plant molecular biology
- 2 present an overview of scientific publications.
- 3 identify the key factors of plant specific processes.
  
- 4 summarize the important new insights from a scientific report
  
- 5 explain how certain cellular processes have such important impact on plant growth, biomass production, stress resilience and ultimately plant yield
  
- 6 describe basic processes and physiological responses and developmental processes of a plant
- 7 know key genes are critically involved in plant development.
  
- 8 describe the relationship between the activity of genes, the environment and the phenotypic outcome
- 9 work in a team or in small groups
- 10 make ethical and professional decisions in the context of microteaching
- 11 have insight into the complexities of a problem by means of quantifiable methods and materials
- 12 Extract useful information out of a wealth of available information
- 13 Integrate technological, and biological aspects of research and research papers

### **Creditcontractvoorwaarde**

Toelating tot dit opleidingsonderdeel via creditcontract is mogelijk mits gunstige beoordeling van de competenties

### **Examencontractvoorwaarde**

Dit opleidingsonderdeel kan niet via examencontract gevolgd worden

### **Didactische werkvormen**

Groepswerk, Hoorcollege, Zelfstandig werk, Peer teaching

### **Toelichtingen bij de didactische werkvormen**

A selection of scientific papers and powerpoint presentations will be made available through Ufora

### **Leermateriaal**

Lectures are based on recent scientific publications and reviews. The titles and full text pdf of these publications are communicated via email or Ufora

### **Referenties**

Papers extracted from scientific journals in the field of plant molecular biology

### **Vakinhoudelijke studiebegeleiding**

Individual guidance is offered upon request

### **Evaluatiemomenten**

periodegebonden en niet-periodegebonden evaluatie

### **Evaluatievormen bij periodegebonden evaluatie in de eerste examenperiode**

Mondelinge evaluatie

### **Evaluatievormen bij periodegebonden evaluatie in de tweede examenperiode**

Mondelinge evaluatie

### **Evaluatievormen bij niet-periodegebonden evaluatie**

Participatie, Werkstuk

### **Tweede examenkans in geval van niet-periodegebonden evaluatie**

Examen in de tweede examenperiode is niet mogelijk

**Toelichtingen bij de evaluatievormen**

Students are evaluated during the lectures when they are presenting an overview of an allocated subject and during the discussion after presentations.

**Eindscoreberekening**

Theory: periodic evaluation 80% of total score Practicum: not periodic evaluation 20% of total score.

Students who eschew period aligned and/or non-period aligned evaluations for this course unit may be failed by the examiner.