



## Gene Regulation and Epigenetics (I002621)

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

Studiepunten 3.0

Studietijd 90 u

**Aanbodsessies en werkvormen in academiejaar 2024-2025**

A (semester 2)

Engels

Gent

zelfstandig werk  
werkcollege  
hoorcollege

**Lesgevers in academiejaar 2024-2025**

Kyndt, Tina

LA25

Verantwoordelijk lesgever

**Aangeboden in onderstaande opleidingen in 2024-2025**

Master of Science in Bioscience Engineering: Cell and Gene Biotechnology

3

A

Uitwisselingsprogramma bio-ingenieurswetenschappen: cel- en genbiotechnologie

3

A

(niveau master-na-bachelor)

**Onderwijsstalen**

Engels

**Trefwoorden**

Eukaryotic gene regulation, epigenome, DNA methylation, histone modifications, gene silencing, chromatin, paramutation, imprinting, stress responses, signal transduction

**Situering**

In this course various mechanisms that influence gene expression and protein production in eukaryotes will be discussed: chromatin configuration, DNA methylation, RNA based gene silencing. The importance of gene regulation for the normal development of organisms will be highlighted. The dynamic response of a cell upon influences by the environment (stress responses, signal transduction) will be explained.

**Inhoud**

1. Background
2. Transcriptional regulation and translational regulation
3. Epigenetic mechanisms
  - a. DNA methylation
  - b. Chromatin-based epigenetic mechanisms
  - c. Gene silencing: small and long non-coding RNAs (PTGS and TGS)
  - d. uORFs
4. Regulation at the post-translational level: signal transduction
  - a. Stimuli - receptors
  - b. Messengers
5. Role of epigenetic regulation during development
  - a. examples in animals (parental imprinting)
  - b. examples in plants (transposable elements, paramutation, vernalisation)
6. Role of gene regulation during stress and disease
  - a. cancer, medical diagnostics
  - b. abiotic and biotic stress in plants
7. Seminar on Ethics by guest lecturer

**Begincompetenties**

**Eindcompetenties**

- 1 Insight into the complex gene regulatory networks in eukaryotic organisms.
- 2 Have knowledge about the role of gene regulation in normal biological processes.
- 3 Have knowledge about disturbances of gene regulation which occur during disease and stress responses
- 4 Discuss scientific literature about epigenetic processes.
- 5 Critically analyze the ethical aspects concerning the described techniques.

**Creditcontractvoorwaarde**

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

**Examencontractvoorwaarde**

Dit opleidingsonderdeel kan niet via examencontract gevolgd worden

**Didactische werkvormen**

Werkcollege, Hoorcollege, Zelfstandig werk

**Toelichtingen bij de didactische werkvormen**

This course involves oral lectures and a guest seminar. The students have to write a assignment about two selected scientific articles related to the course content, in which these articles have to be summarized and critically assessed.  
A recommended handbook as well as the slides are distributed for free via UFORA.

**Studiemateriaal**

Geen

**Referenties**

**Vakinhoudelijke studiebegeleiding**

by email or personally (after the class or on appointment)

**Evaluatiemomenten**

periodegebonden en niet-periodegebonden evaluatie

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

Schriftelijke evaluatie met open vragen

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

Schriftelijke evaluatie met open vragen

**Evaluatievormen bij niet-periodegebonden evaluatie**

Werkstuk

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

Examen in de tweede examenperiode is mogelijk

**Toelichtingen bij de evaluatievormen**

Participation (during seminar), assignment, and written exam

**Eindscoreberekening**

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