

Gene Regulation and Epigenetics (1002621)

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

Studiepunten 3.0 **Studietijd 90 u**

Aanbodsessies en werkvormen in academiejaar 2023-2024

A (semester 2)	Engels	Gent	werkcollege hoorcollege zelfstandig werk
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Lesgevers in academiejaar 2023-2024

Kyndt, Tina	LA25	Verantwoordelijk lesgever
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Aangeboden in onderstaande opleidingen in 2023-2024

	stptn	aanbodsessie
Master of Science in Bioscience Engineering: Cell and Gene Biotechnology	3	A
Uitwisselingsprogramma bio-ingenieurswetenschappen: cel- en genbiotechnologie (niveau master-na-bachelor)	3	A

Onderwijstalen

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

Basic knowledge biochemistry, molecular biology, gene technology

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 mits 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.

Leermateriaal

Powerpoint presentation, handbook: Mechanisms of Gene Regulation: How Science works (Carlberg and Molnar, 2020)

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.