GHENT UNIVERSITY

Course Specifications

Valid in the academic year 2024-2025

The Eukaryotic Cell Cycle (C002737)

Course size *(nominal values; actual values may depend on programme)*

Credits 3.0 **Study time 80 h**

Course offerings and teaching methods in academic year 2024-2025

A (semester 1)	English	Gent	lecture

Lecturers in academic year 2024-2025

De Veylder, Lieven	WE09	lecturer-in-charge
Van Damme, Daniël	WE09	co-lecturer

Offered in the following programmes in 2024-2025	crdts	offering
Master of Science in Teaching in Science and Technology(main subject Biochemistry and Biotechnology)	3	A
Master of Science in Biochemistry and Biotechnology	3	A
Exchange programme in Biochemistry and Biotechnology (master's level)	3	A

Teaching languages

English

Keywords

Cell division, DNA replication, mitosis, cyclin-dependent kinases, cyclins, mitose, cytokinase, meiose

Position of the course

The course "The eukaryotic cell cycle" aims to give an overview on the molecular mechanisms that control cell division in the described model systems. The course aims specifically at students that wish to conduct research in the plant or mammalian cell cycle field. After an initial historical overview and a general introduction to the cell cycle, the similarities and differences in cell cycle regulation between yeasts, vertebrates, fly, and plants will be discussed. Special attention will be given to the methodology used in cell cycle research.
This course contributes to the following program competencies: Ma.WE.BB.2 en Ma. WE.BB.3

Contents

1 Introduction to the cell cycle
   a. Cell division in yeast, mammals, and plants
   b. Genetically en molecular analysis of yeast cell cycle mutants
   c. Use of Xenopus oocytes in cell cycle research
   d. Use of cell-free extracts in cell cycle research
   e. Structural aspects of CDK activation
2 The cell cycle control system
   a. CDKs en cyclins
   b. CDK control by phsophorylation
   c. Structural basis of CDK activation
   d. Transcriptional control of cell division
3 Chromosome duplication
   a. Basic principles of DNA synthesis
   b. Activation of replication
   c. Nucleosomes

d. Telomeres en centromers
4 Start of mitosis
a. WEE1 and CDC25
b. Subcellular localization of mitotic proteins
c. Chromatide cohesion and condensation
5 Mitose
a. Centromere duplication
b. Assembly of the spindle
c. Kinetochores
d. Chromosome segregation
6 Anaphase and telophase
a. The spindle checkpoint
b. Aurora kinases
c. Dephosphorylation of CDK substrates
d. Onset of cytokinesis
7 Cytokinesis
a. Positioning of division plane
b. The plant preprophase band
c. Cytokinesis in mammals and yeasts
d. Control of timing of cytokinesis
8 Meiosis
a. Pairing and recombination of homologous chromosomes
b. Meiotic division
c. Apomixis

Initial competences

This course contributes to the following program competencies: Ma.WE.BB.2 en Ma.
WE.BB.3

Final competences

1 Judge cell cycle research for its relevance and scientific value.
2 Gain knowledge on the use of general cell cycle techniques.
3 Interpret and present cell cycle-related research results.

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, Independent work

Extra information on the teaching methods

Discuss scientific literature related to cell division.

Study material

Type: Handbook

Name: The Cell Cycle: Principles of Control
Indicative price: Free or paid by faculty
Optional: no
Language : English
Author : David O'Morgan
ISBN : 978-0-95391-812-6
Online Available : No
Available in the Library : Yes
Available through Student Association : No
Usability and Lifetime within the Course Unit : one-time
Usability and Lifetime within the Study Programme : one-time
Usability and Lifetime after the Study Programme : occasionally
Additional information: Book will be freely available (in loan, need to be returned at day a exam).

References

The Cell Cycle: Principles of control (David Morgan, 2007).
Articles and reviews of international journals.

Course content-related study coaching

Interactive support via Ufora (forums, e-mail), individual: after eletronic consultation

Assessment moments

end-of-term assessment

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

Oral assessment, Presentation

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

Oral assessment, Presentation

Examination methods in case of permanent assessment

Possibilities of retake in case of permanent assessment

not applicable

Extra information on the examination methods

Oral exam with written preparation.

Calculation of the examination mark

Details will be communicated via Ufora.