

Cellular and Molecular Biology (I002419)

Due to Covid 19, the education and evaluation methods may vary from the information displayed in the schedules and course details. Any changes will be communicated on Ufora.

Course size	<i>(nominal values; actual values may depend on programme)</i>		
Credits 4.0	Study time 120 h	Contact hrs	40.0 h

Course offerings and teaching methods in academic year 2020-2021

A (semester 1)	Dutch	Gent	online lecture	0.0 h
			lecture	28.75 h
			practicum	5.0 h
			online seminar: practical PC room classes	6.25 h

Lecturers in academic year 2020-2021

Gheysen, Godelieve	LA25	lecturer-in-charge
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Offered in the following programmes in 2020-2021

	crdts	offering
Bachelor of Science in Bioscience Engineering (main subject Agricultural Sciences)	4	A
Bachelor of Science in Bioscience Engineering (main subject Cell and Gene Biotechnology)	4	A
Bachelor of Science in Bioscience Engineering (main subject Chemistry and Food Technology)	4	A
Bachelor of Science in Bioscience Engineering (main subject Environmental Technology)	4	A
Bachelor of Science in Bioscience Engineering (main subject Forest and Nature Management)	4	A
Bachelor of Science in Bioscience Engineering (main subject Land and Water Management)	4	A
Joint Section Bachelor of Science in Bio-Engineering	4	A

Teaching languages

Dutch

Keywords

Prokaryotic and eukaryotic cells, cell organelles, basic biochemical molecules, DNA, RNA, protein, genome, DNA replication, DNA repair, mutation, recombination, transcription, translation, mitosis, meiosis, gene regulation, epigenetics, Mendelian and non-Mendelian inheritance, evolution, recombinant DNA, PCR, DNA hybridisation, gmo

Position of the course

This course gives the basics for other biology courses within the bachelor programme bioscience engineering, with emphasis on the universal features of life: cell structures, cell replication and genetic information flow.

Contents

1. The building blocks of life
 - 1.1. What is life?
 - 1.2. The molecules of cells
 - 1.3. Origin of life
 - 1.4. Prokaryotic cells
 - 1.5. Eukaryotic cells and organelles
2. From DNA to genome
 - 2.1. DNA- and chromosome structure
 - 2.2. DNA-hybridization, SNP and ASO
 - 2.3. DNA replication in the cell

- 2.4. Mitosis and cytokinesis
- 2.5. Meiosis and DNA recombination
- 2.5. PCR and DNA sequence analysis
- 2.6. Mutation, DNA repair and evolution

3. Gene expression

- 3.1. RNA structure and functions
- 3.2. Transcription, function of a promoter
- 3.3. Splicing, catalytic RNAs
- 3.4. Protein structures
- 3.5. Translation and localization of proteins
- 3.6. Basic principles of gene regulation in pro- and eukaryotes

4. Genetics, epigenetics and heredity

- 4.1. Laws of Mendel, molecular genetics
- 4.2. Non-Mendelian inheritance
- 4.3. Epigenetics

5. Basic principles of recombinant DNA

- 5.1. Restriction enzymes and cloning in plasmids
- 5.2. Transformation, GMO applications and discussions

Exercises

- 1. Analysis and interpretation of microscopic images of cells
- 2. DNA extraction, restriction analysis, PCR, gel electrophoresis
- 3. DNA analysis: mutations, alignments and comparison of sequences, function

Initial competences

No specific prior knowledge required.

Final competences

- 1 Define terminology from cell biology, molecular genetics and recombinant DNA technology
- 2 Distinguish the structures of cells and their compartments
- 3 Recognize macromolecules
- 4 Explain genome and gene structure
- 5 Explain DNA replication, recombination and mutation
- 6 Explain gene expression and its regulation
- 7 Explain the molecular basis of inheritance
- 8 Apply PCR and hybridisation for DNA analysis
- 9 Analyze DNA sequences in databases
- 10 Recognize ethical aspects of DNA analysis

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, practicum, online lecture, online seminar: practical PC room classes

Learning materials and price

References

Becker's World of the Cell, Jeff Hardin & Gregory Bertoni, ninth edition, PEARSON 2018

Course content-related study coaching

Extra information and explanation can be obtained through UFORA, personal contact or email.

Evaluation methods

end-of-term evaluation and continuous assessment

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

Written examination with open questions, written examination with multiple choice questions

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

Written examination with open questions, written examination with multiple choice questions

Examination methods in case of permanent evaluation

Participation, report

Possibilities of retake in case of permanent evaluation

examination during the second examination period is not possible

Calculation of the examination mark

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