

Course Specifications

From the academic year 2017-2018 up to and including the

Molecular Biology II (C003370)

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

Credits 4.0 Study time 105 h Contact hrs 25.0 h

Course offerings and teaching methods in academic year 2018-2019

A (semester 1) Dutch lecture 25.0 h

Lecturers in academic year 2018-2019

Beyaert, Rudi WE14 lecturer-in-charge

Offered in the following programmes in 2018-2019

	crdts	offering
Bachelor of Science in Biochemistry and Biotechnology	4	A
Linking Course Master of Science in Biochemistry and Biotechnology	4	A
Linking Course Master of Science in Bioinformatics	4	A
Preparatory Course Master of Science in Bioinformatics (main subject Systems Biology)	4	A
Preparatory Course Master of Science in Biochemistry and Biotechnology	4	A

Teaching languages

Dutch

Keywords

Eukaryotes, chromatin, transcription, splicing, translation, RNA interference, genome editing, regulatory mechanisms, replication, DNA recombination, DNA repair

Position of the course

To acquire knowledge of the basic processes that lead to expression and regulation of genetic information at the molecular level in eukaryotes

Contents

Classroom lectures (25 contact hours):

Chromatin in eukaryotes (structure and diversity, nucleosome assembly, histons)

Transcription in eukaryotes (molecular mechanisms, polymerase I/II/III, promoter structure, general transcription factors, mediator, capping, elongation factors, termination, mRNA polyadenylation)

RNA splicing (molecular mechanisms, spliceosome, alternative splicing and regulation, self splicing, trans splicing)

Regulation of mRNA transcription (histon modifications, nucleosome remodeling, transcription factors and repressors, NF-kB, nuclear hormone receptors, activation mechanisms and signal transduction, gene silencing)

Posttranscriptional control mechanisms of RNA (RNA editing, RNA stability, quality control, RNA localisation and transport)

Regulatory RNA molecules (siRNA, miRNA, piRNA, 'long non coding' RNA)

RNA interference (molecular mechanisms, role, applications)
Genome editing (zinc fingers, TALEN, CRISPR/Cas)

Translation in eukaryotes (molecular mechanisms, IRES, regulation)

Posttranslational regulation of proteins (phosphorylation, ubiquitination, protein-protein interactions)

DNA replication (molecular mechanisms, cell cycle regulation, telomeres, telomerase, inhibitors)

DNA repair (mutations, repair mechanisms, checkpoints)

DNA recombination (molecular mechanisms of homologous recombination, site specific recombination, transposition, mating type switching, meiotic recombination)

Molecular biological applications in the biomedical sector and bioethics.

Initial competences

Basic knowledge of the principles of molecular biology of transcription and translation (central dogma).

Final competences

- 1 The student will have a good knowledge of the molecular biology of eukaryotes.
- 2 The student will be able to analyze and to understand the scientific literature related to the molecular biology of eukaryotes, and to perform basic molecular experiments and to interpret the results of these experiments.
- 3 The student is aware of some bioethical principles of scientific research.

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

Learning materials and price

Powerpoint presentations of the lessons and illustration materials (scientific publications) are available on Minerva. Handbook: Molecular Biology of the Gene, James D. Watson e.a. (~ 80 EUR) (buying of book is not obligatory). Total cost (excl. book): 25 EUR.

References

several scientific reviews; relevant websites

Course content-related study coaching

The student will have the possibility to ask questions to the lecturer at the end of each lesson. There is also continuous interaction possible via Minerva and e-mail.

Evaluation methods

end-of-term evaluation

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

Written examination

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

Written examination

Examination methods in case of permanent evaluation

Possibilities of retake in case of permanent evaluation

not applicable

Extra information on the examination methods

Periodical evaluation (end of first semester): examination for theoretical knowledge and insight based on multiple open questions.

Calculation of the examination mark

First examination period: sum of marks obtained on multiple open questions (100%).
Second examination period: idem