GHENT UNIVERSITY

Course Specifications

Valid as from the academic year 2020-2021

Gene Technology (C004087)

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

Credits 5.0 **Study time** 150 h **Contact hrs** 45.0 h

Course offerings and teaching methods in academic year 2020-2021

A (semester 1)	English	Gent	online lecture	20.0 h
			online seminar	25.0 h

Lecturers in academic year 2020-2021

Berx, Geert	WE14	lecturer-in-charge
Saelens, Xavier	WE10	co-lecturer

Offered in the following programmes in 2020-2021	**crdts**	**offering**
Bachelor of Science in Molecular Biotechnology	5	A

Teaching languages

English

Keywords

Biologicals, gene expression technology, genome engineering, biotechnology, Next Generation Sequence analysis, gene therapy, recombinant vaccine, advanced cloning technology

Position of the course

The student gets acquainted with the modern gene technology tools. In a research focused manner, with examples of applications, the basic and advanced principles of recombinant protein expression and purification are taught. Special attention will be given to generation and use of display libraries of antibody fragments, production of biologicals and recombinant vaccine development and applications. Nucleotide sequencing methods will be presented (e.g. CHIP seq, RNA seq, DNA seq) discussed and the use of next generation sequencing methods in the context of tumor biology and microbial diversity analysis. RNAi- and CRISPR-Cas9-based genome editing methods will be discussed. Finally, the students will learn how genetic models that mimic human diseases are created as well as the generation and use of vectors for gene therapy

Contents

1. Protein expression and purification
2. Nucleotide sequence analysis: CHIP seq, RNA seq, DNA seq, applications such as intra-tumor diversity profiling
3. Gene therapy with viral vectors
4. Genomic cloning: genomic library construction
5. Production of biologicals in mammalian expression systems
6. Mammalian genome editing: RNAi and CRISPR-Cas
7. Phage and yeast display for antibody fragment selection
8. Recombinant vaccines
9. Genetic construction of human disease models
10. Next Generation Sequencing and microbial diversity

Initial competences

Basic knowledge of molecular biology, cell biology, molecular genetics, immunology, protein biochemistry are known.

Final competences

1 The student has profound insights in how a recombinant protein can be expressed and purified.
2 The student knows and can apply next generation sequencing methods.
3 The student knows how genome editing works and how this can be applied in the laboratory as well as in the clinic, e.g. by using gene therapy.
4 The student has a clear insight in how antibody-fragments can be selected by phage and yeast display techniques.
5 The student is able to apply modern gene expression and technology tools to express a protein, characterize cellular function, to design a vaccine antigen, create surface display libraries.

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, online lecture, online seminar

Extra information on the teaching methods

Because of COVID19, modified working methods can be rolled out if necessary.

Learning materials and price

Electronically available lecture slides

References

Syllabus

Course content-related study coaching

Evaluation methods

end-of-term evaluation

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

Written examination with open questions

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

Written examination with open questions

Examination methods in case of permanent evaluation

Possibilities of retake in case of permanent evaluation

not applicable

Calculation of the examination mark

The written exam holds 20 of the 20 points. To pass this course one has to obtain at least 10/20 for theoretical questions.