GHENT UNIVERSITY

Course Specifications

Valid as from the academic year 2025-2026

Quantitative Cell and Tissue Analysis (E074011)

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

Credits 6.0 **Study time 180 h**

Course offerings and teaching methods in academic year 2025-2026

A (semester 1)	English	Gent	practical
			lecture

Lecturers in academic year 2025-2026

Hendrix, An	GE38	lecturer-in-charge
Skirtach, Andre	LA25	co-lecturer

Offered in the following programmes in 2025-2026	crdts	offering
Bachelor of Science in Engineering(main subject Biomedical Engineering)	6	A
Bridging Programme Master of Science in Bioinformatics(main subject Engineering)	6	A
Master of Science in Electrical Engineering (main subject Communication and Information Technology)	6	A
Master of Science in Electromechanical Engineering(main subject Control Engineering and Automation)	6	A
Master of Science in Electromechanical Engineering(main subject Electrical Power Engineering)	6	A
Master of Science in Electrical Engineering (main subject Electronic Circuits and Systems)	6	A
Master of Science in Bioinformatics(main subject Engineering)	6	A
Master of Science in Electromechanical Engineering(main subject Maritime Engineering)	6	A
Master of Science in Electromechanical Engineering(main subject Mechanical Construction)	6	A
Master of Science in Electromechanical Engineering(main subject Mechanical Energy Engineering)	6	A
Master of Science in Computer Science Engineering	6	A
Master of Science in Photonics Engineering	6	A
Preparatory Course Master of Science in Biomedical Engineering	6	A

Teaching languages

English

Keywords

Cell biology, histology, microscopy, molecular analysis

Position of the course

This course builds on the contents of From Genome tot Organism and focuses on the principles behind and the application of quantitative techniques for the analysis and assessment of the structure and function of extracellular vesicles, cells and tissues.

Contents

- Techniques:
  - Cell and tissue culture techniques
  - Histology and histological techniques
  - Enzyme and Enzyme kinetics
  - Light microscopy techniques
  - Electron microscopy
  - Cell biomechanics and atomic force microscopy
  - Molecular spectroscopy

- PCR (Polymerase Chain Reaction) and qPCR
- Gelelectrophoresis and western blotting
- Introduction into omics
- High-throughput and lab-on-chip technologies
- Applications:
  - Extracellular vesicles
  - Cells
  - Tissues

Initial competences

From Genome to Organism, Optics

Final competences

1 Understand the working principles of techniques to analyze extracellular vesicles, cells and tissues
2 Understanding of histology and histological techniques and being able to interpret histological coupes
3 Understand various complementary techniques for the analysis of cell morphology, cell properties, structure and function and be able to interpret the analyses
4 Understand the relation between cell composition and cell function as inferred from the complementary techniques
5 Understand various complementary techniques for the analysis of the size, the concentration, the desnity and the molecular composition and be able to interpret the analyses

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, Practical, Peer teaching

Extra information on the teaching methods

- Lectures
- Complemented with selected online lectures or pre-recorded lectures with online discussion if applicable
- Practical and demonstrations: applying or demonstrating different techniques for the analysis of extracellular vesicles, cells and tissues
- Complemented with microteaching if applicable: using acquired basic competences to interpret and summarize scientific results from practicals, demonstrations and literature

Study material

None

References

- "Molecular Cell Biology", 5th edition. Lodish, Berk,Matsudaira, Krieger, Scott, Zipursky, Darnell , Freeman NY, 2003
- "Physical biology of the cell", 2nd Edition. R. Phillips, J. Kondev, J. Theriot, H. G. Garcia. Publisher: Garland Science, 2013
- Junqueira's Basic Histology-Text and Atlas. Anthony Mescher, Mcgraw-Hill Education
- General techniques of cell culture. Harrison & Maureen A. Cambridge University Press
- PDF papers and reviews in top ranked journals: nature, science, cell etc..
- Hand-outs

Course content-related study coaching

Assessment moments

end-of-term and continuous assessment

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

Written assessment

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

Written assessment

Examination methods in case of permanent assessment

Participation, Assignment

Possibilities of retake in case of permanent assessment

examination during the second examination period is not possible

Extra information on the examination methods

- Periodic evaluation: written closed-book exam
- Non-periodic evaluation: practicals are compulsory
- The examiner can declare a student who has withdrawn from periodic and / or non-periodic evaluations for this course as failed

Calculation of the examination mark

- Periodic evaluation (95 %)
- Non-periodic evaluation (5 %)
- Practicals are compulsory