GHENT UNIVERSITY

Course Specifications

Valid in the academic year 2024-2025

Tissue Engineering (D001923)

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 2024-2025

A (semester 1)	English	Gent	peer teaching
			lecture
			independent work

Lecturers in academic year 2024-2025

Dmitriev, Ruslan	GE38	lecturer-in-charge
Beele, Hilde	GE34	co-lecturer

Offered in the following programmes in 2024-2025	**crdts**	**offering**
Master of Science in Biomedical Sciences	6	A
Master of Science in Biomedical Engineering	6	A
Master of Science in Biomedical Engineering	6	A

Teaching languages

English

Keywords

Top-down tissue engineering, bottom-up tissue engineering, cell-biomaterial interactions, soft tissue regeneration, hard tissue regeneration, artificial organs, organoids, imaging in tissue engineering, bioprinting, legislation, human body material donation.

Position of the course

This course discusses insights and applications of tissue engineering in regenerative medicine. In the major 'Tissue Engineering and Regenerative Medicine', this course combines several parts from the 1st Master-year. Applications of tissue engineering in vitro as well as in real medical applications are illustrated.

Contents

- (Stem) cells and their applications in tissue engineering.
- Cell-biomaterial interaction (cell adhesion, differentiation, smart biomaterials, ...)
- Tissue engineering strategies: top-down, scaffold-based and bottom-up/modular inspired on developmental biology
- Complex tissue engineering (microtissues, spheroids, bioprinting, ...)
- Challenges in tissue engineering: complex 3D tissues, vascularization
- Legislation and ethical aspects concerning donation of human body material for human applications
- Translational research:
  - musculoskeletal: (fibro)cartilage and bone engineering
  - ophtalmic cells and tissues and their applications
  - peripheral nerve regeneration
  - cancer tissue engineering
  - skin equivalents in cutaneous wound healing (e.g. burn wounds)
  - plastic surgery and other applications

Initial competences

Tissue Engineering builds on certain final competences of Biomaterials and Biocompatibility.

Final competences

1 Knowing the basic principles of tissue engineering.
2 Knowing the different tissue engineering strategies (scaffold based or modular based inspired by developmental biology).
3 Knowing examples of tissue engineered products.
4 To gain insights in the possibilities and limitations of the different tissue engineering strategies.
5 To gain insight in the methods/techniques (3D culture, analysis,...) to evaluate tissue engineered constructs.
6 Knowing the limitations of tissue engineered products and their clinical applications.
7 Application of tissue engineering for specific clinical demands.
8 Application of ethical principles in the framework of the use of human body material for human application.
9 Knowing and to be able to search for relevant legislation concerning human body material.
10 To be able to read international literature and follow lecturers and be able to critically evaluate them.
11 To report, present and discuss selected topics to peers

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, Peer teaching

Extra information on the teaching methods

Autonomous work and microteaching: to report critically and present selected subjects to peer students.

Study material

None

References

Not compulsory:
Clemens van Blitterswijk and Jan de Boer. Tissue Engineering, 2nd edition (2015) ISBN: 978-0-12-420145-3

Course content-related study coaching

After making an appointment with the lecturer

Assessment moments

end-of-term and continuous assessment

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

Professional practice, Written assessment with multiple-choice questions, Written assessment with open-ended questions

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

Written assessment with multiple-choice questions, Written assessment with open-ended questions, 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 possible in modified form

Extra information on the examination methods

Oral exam with written preparation at the 2 lecturers, open questions

Calculation of the examination mark

Combination of periodic evaluation (oral exam with written preparation, 80%) and non-periodic evaluation (report, microteaching, participation, 20%)

- Tissue engineering strategies, (stem) cells, cell/biomaterial interactions, specific tissue engineering, selected applications: 40% of the total score
- Legislation and ethical aspects, skin regeneration and tissue engineered products for ophthalmology: 40% of the total score

• Non-periodic evaluation: 20% of the total score

Unjustified absence during the non-periodic evaluation will give rise to a total maximum score (periodic and non-periodic evaluation) of 9/20 regardless of the score on the periodic evaluation.