GHENT UNIVERSITY

Course Specifications

Valid as from the academic year 2025-2026

Biomaterials and Tissue Engineering (E063671)

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

Credits 5.0 **Study time 150 h**

Course offerings and teaching methods in academic year 2025-2026

A (semester 1)	English	Gent	group work lecture practical
B (semester 1)	Dutch	Gent	

Lecturers in academic year 2025-2026

Dubruel, Peter	WE07	lecturer-in-charge
De Graeve, Iris	VUB	co-lecturer
Dmitriev, Ruslan	GE38	co-lecturer

Offered in the following programmes in 2025-2026	crdts	offering
Master of Science in Electrical Engineering (main subject Communication and Information Technology)	5	A
Master of Science in Electromechanical Engineering(main subject Control Engineering and Automation)	5	A
Master of Science in Electromechanical Engineering(main subject Electrical Power Engineering)	5	A
Master of Science in Electrical Engineering (main subject Electronic Circuits and Systems)	5	A
Master of Science in Electromechanical Engineering(main subject Maritime Engineering)	5	A
Master of Science in Electromechanical Engineering(main subject Mechanical Construction)	5	A
Master of Science in Electromechanical Engineering(main subject Mechanical Energy Engineering)	5	A
Master of Science in Biomedical Engineering	5	A
Master of Science in Biomedical Engineering	5	A
Master of Science in Bioscience Engineering: Cell and Gene Biotechnology	5	A
Master of Science in Chemical Engineering	5	A
Master of Science in Chemical Engineering	5	A
Master of Science in Civil Engineering	5	A
Master of Science in Computer Science Engineering	5	A
Master of Science in Materials Engineering	5	B
Master of Science in Photonics Engineering	5	A
Master of Science in Sustainable Materials Engineering	5	A

Teaching languages

English, Dutch

Keywords

Biomaterials, (bio)polymers, bioceramics, biometals, tissue-biomaterial characterisation, biocompatibility, tissue engineering

Position of the course

The main objective of this course is to provide overview of the types of biomaterials and major tissue engineering approaches. The properties and limitations of polymeric, ceramic and metallic materials for scaffold-based and scaffold-free applications are discussed.

Contents

1 Part on (Bio)polymers: Advanced applications of polymers for medical applications including scaffolds for tissue engineering, polymers for cell encapsulation, thermo responsive materials, Manufacturing, biofabrication and physical properties.
2 Part on bioceramics, biocompatibility and tissue engineering: chemical, physical and mechanical properties of bioceramics and biopolymer-based materials. Biocompatibility, interactions with cells and the body.
3 Part on Biometals: chemical, physical and mechanical properties of biometals, corrosion and applications in the biomedical sector. The basic biometals will be explained, but the main focus will be on the advanced processing including 3D printing technology and advanced biometals such as shape-memory alloys, bio-resorbable metals etc.

Initial competences

General and organic chemistry, basic material science and properties of materials.
Basic cell biology and biochemistry skills.

Final competences

1 Knowledge on the various biomaterials and their applied combinations in the medical sector.
2 Knowledge on the newer developments and forming methods of the various biomaterials.
3 Insights in the potential and limitations of the various biomaterials.
4 Knowledge on methods for in vitro characterization of biomaterials.
5 Knowledge on how biomaterials are developed and improved.

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

Group work, Lecture, Practical

Study material

None

References

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

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

not applicable

Calculation of the examination mark

The exam is composed of three equal partims (1/3 of the final score each):
Biopolymers [written exam (80%) and practical course (20%)]
Bioceramics [written exam (80%) and practical course (20%)]
Biometals [written exam (80%) and group work (20%)]. On the exam, a question from the group work will be asked so that the group work counts for 40% of the total Bioceramics score.
To be allowed to the exam you need to participate in all practical sessions of each part of the course. Students that fail with 7/20 or less on one of the parts, will automatically not pass for the entire course. In that case, during the retake exam

session, the students need to retake each part where their scores were less than 12/20. The practical sessions and assignments cannot be retaken. The score obtained during the practical sessions thus remain valid for the retake exam.