

Course Specifications

Valid as from the academic year 2025-2026

Biomaterials and Tissue Engineering (E063671)

Course size Credits 5.0		(nominal values; actual values may depend on programme)				
		Study time 150 h				
Cou	rse offerings and to	eaching methods in academic y	/ear 2025-2026			
	A (semester 1)	English	Gent	gro	up work	
				lec	ture	
				practical		
	B (semester 1)	Dutch	Gent			
Lec	turers in academic	year 2025-2026				
	Dmitriev, Ruslan			GE38	lecturer-in-ch	arge
	De Graeve, Iris			VUB	co-lecturer	
	Dubruel, Peter			WE07	co-lecturer	
Offered in the following programmes in 2025-2026				crdts	offering	
	Master of Science	in Electrical Engineering (main	subject Communicatio	on and Informatio	n 5	А
	Technology)					
	Master of Science	in Electromechanical Engineeri	ng(main subject Contr	ol Engineering ar	ld 5	А
	Master of Science	in Flectromechanical Engineeri	ng(main subiect Flecti	rical Power	5	А
	Engineering)				J.	
	Master of Science	in Electrical Engineering (main	subject Electronic Circ	uits and Systems) 5	А
	Master of Science	in Electromechanical Engineeri	ng(main subject Marit	ime Engineering)	5	А
	Master of Science Construction)	in Electromechanical Engineeri	ng(main subject Mech	anical	5	А
	Master of Science	in Electromechanical Engineeri	ng(main subject Mech	anical Energy	5	А
	Master of Science	in Biomedical Engineering			5	А
	Master of Science	in Biomedical Engineering			5	А
	Master of Science	in Civil Engineering			5	А
	Master of Science	in Computer Science Engineerin	g		5	А
	Master of Science	in Materials Engineering			5	В
	Master of Science	in Photonics Engineering			5	А
	Master of Science	in Sustainable Materials Engine	erina		5	А

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, bioresorbable 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.