GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Nanotechnology in biomaterials, PG_00065010		
Field of study	Mechanical and Medical Engineering		
Date of commencement of studies	February 2026	Academic year of realisation of subject	2025/2026
Education level	second-cycle studies	Subject group	Obligatory subject group in the field of study Subject group related to scientific research in the field of study
Mode of study	Full-time studies	Mode of delivery	at the university
Year of study	1	Language of instruction	Polish
Semester of study	1	ECTS credits	3.0
Learning profile	general academic profile	Assessment form	assessment
Conducting unit	Division of Biomaterials Technology -> Institute of Manufacturing and Materials Technology -> Faculty of Mechanical Engineering and Ship Technology -> Wydziały Politechniki Gdańskiej		
Name and surname of lecturer (lecturers)	Subject supervisor	dr inż. Michał Bartmański	
	Teachers		

Lesson types and methods of instruction

Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
Number of study hours	15.0	0.0	15.0	15.0	0.0	45

E-learning hours included: 0.0

Learning activity and number of study hours

Learning activity	Participation in didactic classes included in study plan	Participation in consultation hours	Self-study	SUM
Number of study hours	45	8.0	22.0	75

Subject objectives

The aim of the course is to provide knowledge on the following issues: nanotechnologies in biomaterials in diagnostics; in dentistry and maxillofacial surgery; in orthopedics; in cardiology; in internal medicine; in ophthalmology; in surgery; in pharmacotherapy and other medical applications. In addition, the student will be introduced to methods of fabricating surface modifications of implants using nanotechnology and methods of testing them.Translated with www.DeepL.com/Translator (free version)

Learning outcomes

Course outcome	Subject outcome	Method of verification
[K7_K13] is ready for responsible performance of proffesional roles, considering ever-changing need of the society, including self developement and supporting and fullfiling work ethics	The student/student knows the ethical aspects of bionanomaterials research, including research using living organisms, and the impact of nanomaterials on the environment.	[SK2] Assessment of progress of work
[K7_W03] has structured and well-founded knowledge covering issues in the field of medical engineering allowing to design medical devices, rehabilitation systems and to formulate research procedures	The student/student is able to correctly select appropriate techniques to produce a specific surface modification of biomedical materials.	[SW3] Assessment of knowledge contained in written work and projects
[K7_U02] formulates hypotheses to test research problems in the field of medical engineering	The student/student is able to design experiments and determine the effect of manufacturing parameters of surface modification of biomaterials on their properties.	[SU3] Assessment of ability to use knowledge gained from the subject
[K7_W13] explains the main principles of individual and teamwork organization, including various forms of entrepreneurship utilizing knowledge from the field of engineering and technical sciences and disciplines relevant to the course of study	The student/student is able to work in a group, assuming various roles in the group, during the laboratory production of bionanomaterials.	[SW3] Assessment of knowledge contained in written work and projects

Subject contents	Nanotechnologies in biomaterials in diagnostics; in dentistry and maxillofacial surgery; in orthopedics; in cardiology; in internal medicine; in ophthalmology; in surgery; in pharmacotherapy; in other medical applications. Methods for modification of implant surfaces using nanotechnology. Project of implant surface modification technology.	
Prerequisites and co-requisites		
Assessment methods and criteria		

Subject passing criteria	Passing threshold	Percentage of the final grade
Colloquium	56.0%	60.0%
Project	56.0%	20.0%
Laboratory	56.0%	20.0%

Recommended reading	Basic literature	1. A. Zielinski i inni, Nanotechnologie w medycynie i kosmetologii, Wydawnictwo PG, Gdańsk 2018. 2. K. Żelachowska i inni, Nanotechnologia w praktyce, Wydawnictwo Naukowe PWN, Warszawa 2016. 3. R.W. Kelsall, I.W. Hamley, M. Geoghegan. Nanotechnologie, Wydawnictwo Naukowe PWN, Warszawa 2011. 4. K. Kurzydłowski, M. Lewandowska, Nanomateriały inżynierskie konstrukcyjne i funkcjonalne, Wydawnictwo Naukowe PWN, Warszawa 2009. 5. K. Żelachowska, Nanotechnologia, Chemia i medycyna, Wydawnictwo PG, Gdańsk 2016.
	Supplementary literature	1. E. Regis: Nanotechnologia. Narodziny nowej nauki, czyli świat cząsteczka po cząsteczce, Wydawnictwo Prószyński i S-ka, Warszawa 2001. 2. N.P. Mahalik: Micromanufacturing and Nanotechnology, Springer Verlag 2006.
	eResources addresses	
Example issues/ example questions/ tasks being completed	Nanotechnologies in biomaterials in diagnostics.Nanotechnologies in dentistry and maxillofacial surgery.Nanotechnologies in orthopedics.Nanotechnologies in cardiology.Nanotechnologies in ophthalmology.Nanotechnologies in surgery.Methods of surface modification of implants using nanotechnology.Technology of surface modification.	
Work placement	Not applicable	

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