GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Nanotechnology in biomaterials, PG_00057490		
Field of study	Mechanical and Medical Engineering		
Date of commencement of studies	February 2024	Academic year of realisation of subject	2023/2024
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	4.0
Learning profile	general academic profile	Assessment form	assessment
Conducting unit	Zakład Technologii Biomateriałów -> Institute of Manufacturing and Materials Technology -> Faculty of Mechanical Engineering and Ship Technology		
Name and surname of lecturer (lecturers)	Subject supervisor	dr inż. Michał Bartmański	
	Teachers	dr inż. Łukasz Pawłowski dr inż. Michał Bartmański dr inż. Magda Rościszewska dr inż. Alicja Stanisławska dr inż. Beata Majkowska-Marzec dr inż. Magdalena Jażdżewska	

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	10.0	45.0	100

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_W07] He/she in-depth knowledge related to engineering materials and technologies used in mechanical-medical engineering	The student has knowledge in the application of nanobiomaterials in medicine. The student knows basic methods of their surface modification in various fields of medicine.	[SW3] Assessment of knowledge contained in written work and projects
[K7_K01] He/she is aware to acquire the knowledge through the whole life, is able to inspire and to organize to teach himself/herself and others in cooperation and in leading position	The student is able to perform the design of the surface modification technology of a long-term implant as part of group work.	[SK1] Assessment of group work skills [SK2] Assessment of progress of work
[K7_U08] He/she can formulate and verify hypotheses for simple engineering problems and research	The student is able to independently develop simple experiments and determine the effect of manufacturing parameters of surface modification of biomaterials on their properties.	[SU1] Assessment of task fulfilment [SU3] Assessment of ability to use knowledge gained from the subject
[K7_K02] He/she understands outer aspects of influence of mechanical engineer and manager, their social consequences and impact on the environment, needs to follow the rules of ethics and respect for the diversities of views and cultures	The student knows the ethical aspects of bionanomaterials research, including research using living organisms, and the environmental impact of nanomaterials.	[SK2] Assessment of progress of work [SK1] Assessment of group work skills

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	Adresy na platformie eNauczanie: Nanotechnologie w biomateriałach, W, P, L, IMM, sem.01, II st., sem. letni 2023/2024 - Moodle ID: 37761 https://enauczanie.pg.edu.pl/moodle/course/view.php?id=37761

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