



## Subject card

Subject name and code	, PG_00052098						
Field of study	Nanotechnology						
Date of commencement of studies	October 2021	Academic year of realisation of subject			2023/2024		
Education level	first-cycle studies	Subject group			Optional subject group 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	3	Language of instruction			Polish		
Semester of study	6	ECTS credits			3.0		
Learning profile	general academic profile	Assessment form			assessment		
Conducting unit	Department of Materials Engineering and Bonding -> Faculty of Mechanical Engineering and Ship Technology						
Name and surname of lecturer (lecturers)	Subject supervisor	dr inż. Michał Bartmański					
	Teachers	dr inż. Magdalena Jażdżewska dr inż. Łukasz Pawłowski dr inż. Michał Bartmański					
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	30.0	0.0	15.0	0.0	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	5.0		25.0		75
Subject objectives	Gaining of basic knowledge in the applications of technology in selected fields of science and engineering: medicine and cosmetology. Gaining knowledge about selected methods of obtaining and testing bionanomaterials and skills in this field. Development of skills of carry out basic methods of surface modification of bionanomaterials and the production of nanobiomaterials.						
Learning outcomes	Course outcome	Subject outcome			Method of verification		
	K6_W07	The student knows the methods of manufacturing and evaluation of properties of nanomaterials used in medicine and cosmetology.			[SW3] Assessment of knowledge contained in written work and projects [SW1] Assessment of factual knowledge		
	K6_U10	The student can assess the impact of the use of nanotechnology in medicine on the living organism. The student can evaluate the impact of nanotechnology on the environment.			[SU1] Assessment of task fulfilment		
	K6_U09	The student is able to carry out processes for manufacturing surface modification of implants using nanotechnology.			[SU1] Assessment of task fulfilment [SU4] Assessment of ability to use methods and tools		
Subject contents	Nanotechnologies in technology and in everyday life. Classification and techniques for obtaining nanomaterials. Mechanical testing methods of nanomaterials. Physical methods of nanomaterials research. Chemical methods of nanomaterial testing. Nanotechnologies in orthopedics. Nanotechnologies in dentistry. Nanotechnologies in cosmetology.						

Prerequisites and co-requisites			
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Description of laboratory work	56.0%	40.0%
	Colloquium	56.0%	60.0%
Recommended reading	Basic literature	<ol style="list-style-type: none"> <li>1. A. Zielinski i inni, <i>Nanotechnologie w medycynie i kosmetologii (Nanotechnology in medicine and cosmetology)</i> Wydawnictwo PG, Gdańsk 2018.</li> <li>2. K. Żelachowska i inni, <i>Nanotechnologia w praktyce (Nanotechnology in practice)</i>, Wydawnictwo Naukowe PWN, Warszawa 2016.</li> <li>3. R.W. Kelsall, I.W. Hamley, M. Geoghegan, <i>Nanotechnologie (Nanotechnology)</i>, Wydawnictwo Naukowe PWN, Warszawa 2011.</li> <li>4. K. Kurzydłowski, M. Lewandowska, <i>Nanomateriały inżynierskie konstrukcyjne i funkcjonalne (Structural and functional engineering nanomaterials)</i>, Wydawnictwo Naukowe PWN, Warszawa 2009.</li> <li>5. K. Żelachowska, <i>Nanotechnologia. Chemia i medycyna (Nanotechnology. Chemistry and medicine)</i>, Wydawnictwo PG, Gdańsk 2016.</li> </ol>	
	Supplementary literature	<ol style="list-style-type: none"> <li>1. E. Regis: <i>Nanotechnologia. Narodziny nowej nauki, czyli świat cząsteczka po cząsteczce. (Nanotechnology. The new science is born: the world, molecule by molecule)</i>, Wydawnictwo Prószyński i S-ka, Warszawa 2001.</li> <li>2. N.P. Mahalik: <i>Micromanufacturing and Nanotechnology</i>, Springer Verlag 2006.</li> </ol>	
	eResources addresses	Adresy na platformie eNauczanie: Nanotechnologie w medycynie i kosmetologii W, L, Nano, sem.06, I st., sem letni 2023/2024 - Moodle ID: 37759 <a href="https://enauczanie.pg.edu.pl/moodle/course/view.php?id=37759">https://enauczanie.pg.edu.pl/moodle/course/view.php?id=37759</a>	
Example issues/ example questions/ tasks being completed	Application of nanotechnology in orthopedics.Application of nanotechnology in cosmetology.Application of nanotechnology in dentistry.Methods of biological research on nanomaterials.		
Work placement	Not applicable		