GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Nanotechnology, PG_00053338		
Field of study	Biomedical Engineering, Biomedical Engineering, Biomedical Engineering		
Date of commencement of studies	October 2022	Academic year of realisation of subject	2022/2023
Education level	second-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	1	Language of instruction	Polish
Semester of study	2	ECTS credits	5.0
Learning profile	general academic profile	Assessment form	exam
Conducting unit	Department of Inorganic Chemistry -> Faculty of Chemistry		
Name and surname of lecturer (lecturers)	Subject supervisor		
	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	30.0	0.0	60

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	60	10.0	55.0	125

Subject objectives

The aim of the course is to acquaint students with the history, present state and future prospects of nanotechnology - an interdisciplinary field combining achievements in physics, chemistry, biology, material science, and many others. Awareness of technological capabilities at the nanoscale will give future graduates a chance to use them in their work.

Learning outcomes

Course outcome	Subject outcome	Method of verification
[K7_K02] is ready to provide critical evaluation of received content and to acknowledge the importance of knowledge in solving cognitive and practical problems	is able to employ methods of molecular modeling and to use learned tools for designing nanodevices by himself	[SK2] Assessment of progress of work
[K7_U52] can examine tissues, materials and biomaterials used in biomedical engineering	can study the properties of nanomaterials using spectroscopic and diffraction techniques	[SU4] Assessment of ability to use methods and tools
[K7_W02] knows and understands, to an increased extent, selected laws of physics and physical phenomena, as well as methods and theories explaining the complex relationships between them, constituting advanced general knowledge in the field of technical sciences related to the field of study	knows the history, current developments and prospects of nanotechnology mainly in the field of chemistry, but also other fields of knowledge	[SW1] Assessment of factual knowledge
[K7_U51] can conduct complex laboratory work connected with chemistry and biochemistry, specific to biomedical engineering	is able to synthesize nanostructures, i.e. quantum dots, carbon nanoparticles, magnetic nanoparticles and doped nanoparticles	[SU1] Assessment of task fulfilment

<table>
<tr><td>Subject contents</td><td>Lecture: Molecular modeling. History of nanotechnology. Nanolithography. Nanoelectronics. Computer data storage. Structural research. Coordination and supramolecular chemistry. Carbon nanostructures. Quantum effects in nanostructures. 0, 1 and 2D nanostructures. Calculation exercises.

Project: students become acquainted with the basics of molecular modeling and design nanodevices by themselves.

Laboratories: students synthesise selected nanostructures and examine their properties.

A detailed program of the course as well as the project and seminar topics are regularly updated and posted on the "eNauczanie" platform.</td></tr>
<tr><td>Prerequisites and co-requisites</td><td>Completed courses at the undergraduate level in the following subjects: mathematics, physics, general, inorganic, organic and physical chemistry.</td></tr>
<tr><td>Assessment methods and criteria</td><td>
<table>
<tr><th>Subject passing criteria</th><th>Passing threshold</th><th>Percentage of the final grade</th></tr>
<tr><td>Project</td><td>60.0%</td><td>35.0%</td></tr>
<tr><td>Exam</td><td>60.0%</td><td>40.0%</td></tr>
<tr><td>Laboratory</td><td>60.0%</td><td>25.0%</td></tr>
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<tr><td>Recommended reading</td><td>
<table>
<tr><td>Basic literature</td><td>• R. W. Kelsall, I. W. Hamley, M. Geoghegan: Nanotechnologie. Wydawnictwo Naukowe PWN, Warszawa 2008.
• Ch. P. Poole Jr., F. J. Owens: Introduction to Nanotechnology. Wiley-Interscience Hoboken, New Jersey 2003.
• B. Dręczewski, A. Herman, P. Wroczyński: Nanotechnologia stan obecny i perspektywy, Wydawnictwo PG, Gdańsk 1997.</td></tr>
<tr><td>Supplementary literature</td><td>• K. Żelechowska: Nanotechnologia w chemii i medycynie. Wydawnictwo PG, Gdańsk 2014.
• E. Regis: Nanotechnologia. Narodziny nowej nauki, czyli świat cząsteczka po cząsteczce. Prószyński i S-ka, Warszawa 2001.</td></tr>
<tr><td>eResources addresses</td><td>Adresy na platformie eNauczanie:</td></tr>
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<tr><td>Example issues/ example questions/ tasks being completed</td><td>Available on the "eNauczanie" platform.</td></tr>
<tr><td>Work placement</td><td>Not applicable</td></tr>
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