GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	NANOTECHNOLOGY, PG_00063190		
Field of study	Chemical Technology		
Date of commencement of studies	February 2025	Academic year of realisation of subject	2024/2025
Education level	second-cycle studies	Subject group	Obligatory subject group 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	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	dr inż. Andrzej Okuniewski	
	Teachers	dr inż. Andrzej Okuniewski	

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

Additional information:
Lectures will be conducted remotely using the eNauczanie and MS Teams platforms.

The computer project and laboratory sessions will be held on-site in the rooms specified in the class schedule.

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	5.0	60.0	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_U09] prepares documentation of experiments and technological processes using professional terminology	The student is able to prepare reports on the laboratory experiments and project work carried out. They describe synthesis and characterization processes of nanostructures using proper nanotechnology terminology.	[SU5] Assessment of ability to present the results of task
[K7_W03] selects methods of data analysis, including statistical and modelling, useful for solving scientific and technological problems	The student can identify and choose suitable computational methods and data analysis techniques to solve specific nanotechnology-related problems. They understand the principles and limitations of each method and can evaluate the suitability of a given method for a particular problem.	[SW1] Assessment of factual knowledge [SW3] Assessment of knowledge contained in written work and projects
[K7_U01] designs experiments using computer methods of data analysis, computer simulations and based on the state of the knowledge in accordance with the latest scientific literature	The student is able to plan and conduct computer simulations to design nanostructures, analyze their properties, and investigate nanoscale phenomena. As part of the computer project, the student selects appropriate modeling methods and verifies the obtained results against the scientific literature.	[SU1] Assessment of task fulfilment [SU3] Assessment of ability to use knowledge gained from the subject [SU4] Assessment of ability to use methods and tools

Subject contents

Lecture: Molecular modeling. History of nanotechnology. Nanolithography. Nanoelectronics. Computer data storage. Structural research. Coordination and supramolecular chemistry. Carbon nanostructures. Quantum effects in nanostructures. 0-3D 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 laboratory are regularly updated and posted on the eNauczanie platform.

Prerequisites and co-requisites

Completed courses at the undergraduate level in the following subjects: mathematics, physics, general, inorganic, organic and physical chemistry.

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
Project	60.0%	30.0%
Exam	60.0%	40.0%
Laboratory	60.0%	30.0%

Recommended reading

Basic literature	• 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.
Supplementary literature	• 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.
eResources addresses	Adresy na platformie eNauczanie: Nanotechnologia 2024/25 - Moodle ID: 43910 https://enauczanie.pg.edu.pl/moodle/course/view.php?id=43910

Example issues/ example questions/ tasks being completed

Available on the eNauczanie platform.

Work placement

Not applicable

Document generated electronically. Does not require a seal or signature.