GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	, PG_00069413		
Field of study	Nanotechnology		
Date of commencement of studies	October 2023	Academic year of realisation of subject	2026/2027
Education level	first-cycle studies	Subject group	
Mode of study	Full-time studies	Mode of delivery	at the university
Year of study	4	Language of instruction	Polish
Semester of study	7	ECTS credits	2.0
Learning profile	general academic profile	Assessment form	assessment
Conducting unit	Division of Ceramics -> Institute of Nanotechnology and Materials Engineering -> Faculty of Applied Physics and Mathematics -> Faculties of Gdańsk University of Technology		
Name and surname of lecturer (lecturers)	Subject supervisor	dr hab. inż. Aleksandra Mielewczyk-Gryń	
	Teachers	dr hab. inż. Aleksandra Mielewczyk-Gryń	

Lesson types

Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
Number of study hours	15.0	0.0	0.0	0.0	0.0	15

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	15	1.0	34.0	50

Subject objectives

The aim of the course is to present students with research methods of nanotechnology that are applied in other scientific fields, such as biology, medicine, chemistry, physics, archaeology, and historical sciences. Students will acquire knowledge about tools and techniques used for analysis and imaging at the nanoscale, their application possibilities, and their limitations.

Learning outcomes

Course outcome	Subject outcome	Method of verification
K6_U06	knows the limitations and challenges related to transferring nanotechnology methods to other disciplines	[SU5] Assessment of ability to present the results of task [SU3] Assessment of ability to use knowledge gained from the subject
K6_W06	has knowledge of the properties of nanomaterials and how these properties can be related to other fields of knowledge	[SW1] Assessment of factual knowledge
K6_W07	knows the basic research techniques used in nanotechnology (e.g., atomic force microscopy, electron microscopy, spectroscopic methods)	[SW3] Assessment of knowledge contained in written work and projects [SW1] Assessment of factual knowledge

Subject contents

Course content – lecture
The research methods include calorimetric techniques, such as scanning calorimetry and Calvet-type calorimetry, as well as microscopic methods and advanced chemical composition analysis techniques based on microscopic imaging. Resonance methods, including NMR and ESR, are also employed, along with spectroscopic techniques utilizing electron emission, such as XPS, AES, and UPS. Important methods also include ion scattering techniques, infrared and Raman spectroscopy, optical property measurements, and low-temperature measurement techniques. Additionally, electrochemical methods for studying electrical properties, such as voltammetry and impedance spectroscopy, as well as diffraction techniques, including neutron diffraction, are used.

Prerequisites and co-requisites

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
Essay	51.0%	50.0%
Test	51.0%	50.0%

Recommended reading

Basic literature	Experimental Methods in the Physical Sciences

	Supplementary literature	scientific papers eg: J Biomol Tech. 2010 Dec; 21(4): 167193. Hyperfine Interactions 154: 159176, 2004 Proc Natl Acad Sci U S A. 2013 Apr 23; 110(17): 66516656
	eResources addresses	
Example issues/ example questions/ tasks being completed	- Proteins denaturation analysis. - Microscopy in archeology. - photoelectric effect and it's applications	
Practical activites within the subject	Not applicable	

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