



Subject card

Subject name and code	, PG_00070394						
Field of study	Nanotechnology						
Date of commencement of studies	October 2025	Academic year of realisation of subject			2025/2026		
Education level	first-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	2	ECTS credits			5.0		
Learning profile	general academic profile	Assessment form			exam		
Conducting unit	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		prof. dr hab. inż. Wojciech Sadowski				
	Teachers		prof. dr hab. inż. Wojciech Sadowski				
Lesson types	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	30.0	0.0	0.0	0.0	15.0	45
	E-learning hours included: 0.0						
	eNauczanie source addresses: Moodle ID: 4540 Wstęp do nanotechnologii <a href="https://enauczanie.pg.edu.pl/2025/course/view.php?id=4540">https://enauczanie.pg.edu.pl/2025/course/view.php?id=4540</a>						
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	3.0	77.0	125		
Subject objectives	The aim of the course is to familiarize students with the properties of materials at the transition from the macroscopic to the nano-sized scale, with basic manufacturing techniques, and with the study of their properties and applications.						
Learning outcomes	Course outcome	Subject outcome			Method of verification		
	[K6_U01] can learn independently, obtain information from literature, databases and other properly selected sources	The student is able to learn independently and obtain information related to nanotechnology from literature and other appropriately selected sources.			[SU2] Assessment of ability to analyse information		
	[K6_K05] can present effects of their own work, provide information in a clear manner, communicate and self-evaluate, and give constructive feedback on the work of others.	The student is able to present the results of his/her work and convey information related to nanotechnology in an understandable way.			[SK4] Assessment of communication skills, including language correctness		
	[K6_W07] has systematic knowledge of the physical and chemical principles of nanotechnology (methods of obtaining nanostructures, types of nanostructures, their properties, basic research methods).	The student has systematic, basic knowledge of the physical and chemical foundations of nanotechnology (methods of obtaining nanostructures, their properties, basic research methods).			[SW1] Assessment of factual knowledge		

Subject contents	<p>Course content – lecture</p> <p>Historical Introduction to Nanotechnology</p> <p>Elements of Solid State Structure and Surface (Crystallography, Chemical Bonding, Band Structure)</p> <p>Physical Foundations of Nanotechnology, Nanosize Criteria, Size Effects, 3D, 2D, 1D, and 0D Structures.</p> <p>Nucleation and Crystallization.</p> <p>Methods for Obtaining Nanomaterials: Thin Films and Film Structures, Wires and Quantum Dots, Nanopowders.</p> <p>Electrical, Magnetic, Optical, and Mechanical Properties of Nanosized Solids.</p> <p>Methods for Investigating Nanosized Solids: STM and AFM Microscopy.</p> <p>Fullerenes, Nanotubes, Graphene. 2D Materials.</p> <p>Elements of Superconductivity.</p> <p>Nanotechnology in Applications (Electronics, Various Fields of Technology, Medicine)</p>		
	<p>Course content – seminar</p> <p>Overview of various applications of nanomaterials and functional nanostructures,</p> <p>e.g. in electronics, optoelectronics, medicine, energy (energy conversion), environmental protection,</p> <p>food industry, architecture, etc.</p>		
Prerequisites and co-requisites	Fundamentals of material science		
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Passing the lecture content	51.0%	70.0%
	Passing the seminar, presentation	100.0%	30.0%
Recommended reading	Basic literature	<p><b>Nanotechnologie.</b> R.W. Kelsall et al. Wyd. PWN, 2008</p> <p><b>Basic Principles of Nanotechnology.</b> Wesley C. Sanders. 2019 by Taylor &amp; Francis Group, LLC CRC</p> <p><b>Introduction to Nanoscience.</b> S.M. LINDSAY. Oxford University Press Inc., New York © S.M. Lindsay 2010.</p>	
	Supplementary literature	<p><b>Introduction to Nano Basics to Nanoscience and Nanotechnology.</b> Editors - Amretashis Sengupta Chandan Kumar Sarkar. Springer-Verlag Berlin Heidelberg 2015</p> <p><b>History of Nanotechnology. From Pre-Historic to Modern Times.</b> Edited by Madhuri Sharon. 2019 by John Wiley &amp; Sons, Inc.; 2019 Scrivener Publishing LLC</p>	
	eResources addresses		

<p>Example issues/ example questions/ tasks being completed</p>	<p>Physical foundations of nanotechnology - nanosize criteria, size effects, 3D, 2D, 1D, and 0D structures.</p> <p>Nucleation and crystallization.</p> <p>Methods for obtaining nanomaterials: thin films and thin-film structures, wires and dots.</p> <p>Methods for studying nanosized bodies. STM and AFM microscopy.</p> <p>Fullerenes, nanotubes, graphene.</p>
<p>Practical activities within the subject</p>	<p>Not applicable</p>

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