



## Subject card

Subject name and code	, PG_00058876						
Field of study	Nanotechnology						
Date of commencement of studies	October 2023		Academic year of realisation of subject		2024/2025		
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	2		Language of instruction		Polish		
Semester of study	3		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						
Name and surname of lecturer (lecturers)	Subject supervisor		prof. dr hab. inż. Bogusław Kusz				
	Teachers		prof. dr hab. inż. Bogusław Kusz				
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	30.0	0.0	30.0	0.0	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		5.0		60.0	125
Subject objectives	The influence of temperatures, including high and very low temperatures, on the physical phenomena governing matter at the macro and nano scale. Vacuum technique as a way to purity of measurements and processes on a macro and non-nano scale.						
Learning outcomes	Course outcome		Subject outcome		Method of verification		
	K6_W10		The student knows how to plan and conduct an experiment and is able to critically analyze its results.		[SW1] Assessment of factual knowledge		
	K6_W09		The student has basic knowledge of the construction and operation of devices that produce and measure the temperature of objects and ambient pressure.		[SW3] Assessment of knowledge contained in written work and projects		
	K6_U02		The student is able to analyze and solve simple scientific and technical problems based on scientific methodology.		[SU3] Assessment of ability to use knowledge gained from the subject		
	K6_U04		The student has experience in laboratory work.		[SU1] Assessment of task fulfilment		
	K6_K05		The student is able to convey information in a universally understandable way, communicate and self-assess.		[SK1] Assessment of group work skills		
Subject contents	The influence of low and high temperature on the properties of matter at the macro and nano scale. Methods of producing, maintaining and measuring the temperature of test objects.						
	The impact of the use of appropriate vacuum on the purity of the matter production process at the macro and nano scale. Methods of creating, maintaining and measuring vacuum.						
Prerequisites and co-requisites							

Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	laboratory	80.0%	51.0%
	lecture	51.0%	49.0%
Recommended reading	Basic literature	Internet.	
	Supplementary literature	None.	
	eResources addresses	Podstawowe <a href="https://enauczanie.pg.edu.pl/moodle/course/edit.php?id=37364">https://enauczanie.pg.edu.pl/moodle/course/edit.php?id=37364</a> - PTPiK Adresy na platformie eNauczanie:	
Example issues/ example questions/ tasks being completed	Metody wytwarzania, utrzymania i pomiaru temperatury rzędu 10mK obiektów badań.		
	Wpływ zastosowania odpowiednie próżni na czystość procesu wytwarzania materii w skali makro i nano.		
	Metody wytwarzania,utrzymania i pomiaru próżni rzędu 10-8Pa..		
	Czy niska temperatura w komputerach kwantowych jest niezbędna ? .		
	Czy wysoka temperatura w reaktorach jądrowych i fuzyjnych jest konieczna i dlaczego ?.		
	Wykorzystanie próżni w technologii nano..		
Work placement	Not applicable		

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