GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Dielectric Materials in Nanotechnology, PG_00069708		
Field of study	Nanotechnology		
Date of commencement of studies	October 2024	Academic year of realisation of subject	2026/2027
Education level	first-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	3	Language of instruction	Polish
Semester of study	5	ECTS credits	1.0
Learning profile	general academic profile	Assessment form	assessment
Conducting unit	Division of Electrochemistry and Surface Physical Chemistry -> Institute of Nanotechnology and Materials Engineering -> Faculty of Applied Physics and Mathematics -> Wydziały Politechniki Gdańskiej		
Name and surname of lecturer (lecturers)	Subject supervisor	dr hab. inż. Natalia Wójcik	
	Teachers		

Lesson types and methods of instruction

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

eNauczanie source addresses:

Moodle ID: 1176 Materiały dielektryczne w nanotechnologii
https://enauczanie.pg.edu.pl/2025/course/view.php?id=1176

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	3.0	7.0	25

Subject objectives

Familiarization with the properties of dielectric materials and their practical applications in the field of nanotechnology.

Learning outcomes

Course outcome	Subject outcome	Method of verification
[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).	Has specialist knowledge of the application of nanotechnology in the field of dielectrics.	[SW1] Assessment of factual knowledge
[K6_W01] has knowledge of materials science and understands its key role in the progress of civilization	Has basic knowledge of dielectric materials, their properties, measurement methods and applications.	[SW1] Assessment of factual knowledge

Subject contents

The lecture will include a brief overview of dielectric materials and their characteristics. The polarization mechanisms of dielectrics will be discussed. The mechanisms of conduction in dielectrics and dielectric nanostructures will be presented using various specific examples, along with theories for analyzing them. Techniques for studying the electrical properties of nanodielectrics will be discussed.
Nonlinear dielectrics, including ferroelectrics and antiferroelectrics, and their applications in electronics and nanoelectronics will be presented next. The types of capacitors and their structures will be discussed. The lecture will focus on the practical application of dielectric nanostructures in everyday life.

Prerequisites and co-requisites

Basic knowledge of semiconductors.

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
Lecture	50.0%	100.0%

Recommended reading

Basic literature	Friedrich Kremer, Advances in Dielectrics, Springer
Supplementary literature	Scientific articles on modern dielectrics and dielectric nanocomposites.
eResources addresses	

Example issues/ example questions/ tasks being completed	List and discuss the mechanisms of dielectric polarization. Applications of dielectrics in everyday life. Nanotechnology in dielectrics.
Work placement	Not applicable

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