



## Subject card

Subject name and code	, PG_00058863						
Field of study	Nanotechnology						
Date of commencement of studies	October 2023		Academic year of realisation of subject		2023/2024		
Education level	second-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	1		Language of instruction		English		
Semester of study	2		ECTS credits		4.0		
Learning profile	general academic profile		Assessment form		assessment		
Conducting unit	Zakład Elektrochemii i Fizykochemii Powierzchni -> Instytut Nanotechnologii i Inżynierii Materiałowej -> Faculty of Applied Physics and Mathematics						
Name and surname of lecturer (lecturers)	Subject supervisor		dr hab. inż. Natalia Wójcik				
	Teachers		dr hab. inż. Natalia Wójcik				
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	30.0	0.0	15.0	0.0	0.0	45
	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	45		5.0		50.0	100
Subject objectives	Learning about modern amorphous materials and technological issues related to their application.						
Learning outcomes	Course outcome		Subject outcome		Method of verification		
	K7_U07		The student knows the theoretical basis of the science of amorphous materials.		[SU2] Assessment of ability to analyse information		
	K7_W03		The student knows the basic applications of modern amorphous materials and glass nanocomposites.		[SW1] Assessment of factual knowledge		
	K7_U01		The student prepares a presentation on modern amorphous materials and their applications.		[SU1] Assessment of task fulfilment		
	K7_W01		The student knows the theoretical basis of the science of amorphous materials. The student proposes the basic methods of testing the properties of amorphous materials.		[SW1] Assessment of factual knowledge		
Subject contents	<ul style="list-style-type: none"><li>• Glass around us</li><li>• Preparation, conditions</li><li>• Manufacturing methods</li><li>• Basic properties of glasses: electrical, thermal, mechanical, optical</li><li>• Special glasses and glass-ceramic composites: bioglass, oxynitride glass, ferroelectrics, ferromagnetics, multiferroics, spin glasses, non-linear materials</li><li>• Nanostructures in glass</li></ul>						
Prerequisites and co-requisites							
Assessment methods and criteria	Subject passing criteria		Passing threshold		Percentage of the final grade		
	laboratory		50.0%		30.0%		
	assignment and presentation		50.0%		70.0%		

Recommended reading	Basic literature	<ul style="list-style-type: none"> <li>• Introduction to Glass Science and Technology, James E. Shelby, The Royal Society of Chemistry 2005</li> <li>• Materials Science and Technology Glasses and Amorphous Materials, Vol. 9, Volume Editor J. Zarzycki</li> </ul>
	Supplementary literature	N/A
	eResources addresses	Adresy na platformie eNauczenie: Glasses and glass-nanocomposites/ Szkła specjalne - Moodle ID: 37751 <a href="https://enauczenie.pg.edu.pl/moodle/course/view.php?id=37751">https://enauczenie.pg.edu.pl/moodle/course/view.php?id=37751</a>
Example issues/ example questions/ tasks being completed	1. What is bioglass and what properties should it have? 2. Where are bioglasses used?	
Work placement	Not applicable	