



## Subject card

Subject name and code	, PG_00064500						
Field of study	Materials Engineering, Materials Engineering						
Date of commencement of studies	February 2024		Academic year of realisation of subject		2024/2025		
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		Polish		
Semester of study	2		ECTS credits		5.0		
Learning profile	general academic profile		Assessment form		assessment		
Conducting unit	Division of Nanomaterials Physics -> Institute of Nanotechnology and Materials Engineering -> Faculty of Applied Physics and Mathematics						
Name and surname of lecturer (lecturers)	Subject supervisor		prof. dr hab. inż. Wojciech Sadowski				
	Teachers						
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	30.0	0.0	0.0	30.0	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		0.0		0.0	60
Subject objectives	The aim of the course is to familiarize students with various effects related to phase boundaries in materials forming surfaces and inter-surface areas.						
Learning outcomes	Course outcome		Subject outcome		Method of verification		
	K7_U01		The student is able to obtain information from literature, databases and other properly selected sources, also in English; is able to integrate the information obtained, interpret it, draw conclusions and formulate and justify opinions.		[SU2] Assessment of ability to analyse information		
	K7_K01		The student understands the need for lifelong learning, is able to inspire and organize the learning process, is able to appropriately define priorities for the implementation of tasks specified by himself or others		[SK5] Assessment of ability to solve problems that arise in practice [SK3] Assessment of ability to organize work		
	K7_W07		The student has knowledge of the physicochemical properties of the surfaces of various materials and the influence of the surface on the properties of materials		[SW1] Assessment of factual knowledge		

Subject contents	Atomic structure, chemical bonds and crystal structure. Surface physicochemistry.  Treatment of the surface layer. Materials and their properties. Friction, wear and lubrication. Tribology. Corrosion.  Treatment of the surface layer without changing its chemical composition. Thermo-chemical treatment. Vapor deposition. chemical (CVD) and physical (PVD).  Fire coatings. Galvanic coatings		
Prerequisites and co-requisites	Inorganic chemistry.  Nanotechnology.		
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
		100.0%	40.0%
		50.0%	60.0%
Recommended reading	Basic literature	Atkins Physical Chemistry V1: Thermodynamics and Kinetics	
	Supplementary literature	Atkins Physical Chemistry V1: Thermodynamics and Kinetics	
	eResources addresses	Adresy na platformie eNauczanie:	
Example issues/ example questions/ tasks being completed	1. Treatment of the surface layer  2. Materials and their properties  3. Atomic structure, chemical bonds and crystal structure  4. Friction, wear and lubrication. Tribology  5. Corrosion  6. Treatment of the surface layer without changing its chemical composition  7. Thermo-chemical treatment  8. Chemical vapor deposition (CVD) and physical vapor deposition (PVD)  9. Fire coatings  10. Galvanic coatings  12. Hardfacing  13. Paint coatings		
Work placement	Not applicable		