



## Subject card

Subject name and code	Surface physical chemistry, PG_00062729						
Field of study	Technologies for Industry 5.0						
Date of commencement of studies	October 2024		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	2		Language of instruction		Polish		
Semester of study	3		ECTS credits		6.0		
Learning profile	general academic profile		Assessment form		exam		
Conducting unit	Department of Solid State Physics -> Faculty of Applied Physics and Mathematics						
Name and surname of lecturer (lecturers)	Subject supervisor		dr hab. inż. Jacek Ryl				
	Teachers						
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	15.0	75
	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	75		5.0		70.0	150
Subject objectives	The aim of the course is to familiarize students with the issues related to phenomena occurring on the surface limiting material objects. Discussion of the consequences of the occurrence of surface energy. Analysis of the possibilities of using surface phenomena in industrial technologies, with particular emphasis on the topics related to the functioning of sensors, degradation and corrosion processes and the properties of semiconductors.						
Learning outcomes	Course outcome		Subject outcome		Method of verification		
	[K6_K03] effectively, clearly and unambiguously conveys information, describes activities and communicates their results and opinions of a specialist engineer using appropriate communication methods and tools		The student is able to describe issues related to the physicochemistry of surfaces, referring to their influence on the functional properties of materials and devices.		[SK4] Assessment of communication skills, including language correctness		
	[K6_U01] applies knowledge of mathematics, physics, chemistry, IT tools and other engineering disciplines to solve theoretical, engineering and technological problems		The student is able to use interdisciplinary knowledge to solve problems related to surface engineering, is able to select measurement tools to assess specific surface phenomena		[SU3] Assessment of ability to use knowledge gained from the subject [SU4] Assessment of ability to use methods and tools		
	[K6_W01] demonstrates knowledge and understanding of mathematics, physics, chemistry and IT tools at the level necessary to formulate and solve typical engineering and technological problems		The student has knowledge of the processes and phenomena occurring at the surface and interface between materials, has knowledge of measurement tools for surface processes.		[SW1] Assessment of factual knowledge		

Subject contents	Introduction - ideal and real surface.		
	Surface tension and surface thermodynamics.		
	Chemical and physical adsorption and its influence on surface properties.		
	Physics of semiconductor surface.		
	Surface effects in technology (flotation, detergention, etc.).		
	Electrochemistry vs surface chemistry		
	Modification and functionalization of sensors surface		
	Natural and artificial coatings.		
	Colloids.		
	Selected technologies of thin layers deposition.		
Prerequisites and co-requisites			
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Exam	60.0%	40.0%
	Multimedia assisted oral presentation	60.0%	20.0%
	Laboratory mark	60.0%	40.0%
Recommended reading	Basic literature	<b>K. W. Kolasinski: Surface Science - Foundations of Catalysis and Nanoscience</b>	
	Supplementary literature	<b>G. Bracco,B. Hols: Surface Science Techniques</b>	
	eResources addresses	Adresy na platformie eNauczanie:	
Example issues/ example questions/ tasks being completed	Definition of surface energy and surface tension.		
	Discussion of the surface influence on semiconductor band structure.		
	Surface effects in technology.		
	Adsorption process description.		
	Analysis of reasons of the segregation effect in alloys.		
Work placement	Not applicable		

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