



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	<p>Introduction - ideal and real surface.</p> <p>Surface tension and surface thermodynamics.</p> <p>Chemical and physical adsorption and its influence on surface properties.</p> <p>Physics of semiconductor surface.</p> <p>Surface effects in technology (flotation, detergention, etc.).</p> <p>Electrochemistry vs surface chemistry</p> <p>Modification and functionalization of sensors surface</p> <p>Natural and artificial coatings.</p> <p>Colloids.</p> <p>Selected technologies of thin layers deposition.</p>														
Prerequisites and co-requisites															
Assessment methods and criteria	<table border="1"> <thead> <tr> <th data-bbox="456 943 794 976">Subject passing criteria</th> <th data-bbox="799 943 1137 976">Passing threshold</th> <th data-bbox="1142 943 1481 976">Percentage of the final grade</th> </tr> </thead> <tbody> <tr> <td data-bbox="456 983 794 1010">Exam</td> <td data-bbox="799 983 1137 1010">60.0%</td> <td data-bbox="1142 983 1481 1010">40.0%</td> </tr> <tr> <td data-bbox="456 1016 794 1066">Multimedia assisted oral presentation</td> <td data-bbox="799 1016 1137 1066">60.0%</td> <td data-bbox="1142 1016 1481 1066">20.0%</td> </tr> <tr> <td data-bbox="456 1072 794 1099">Laboratory mark</td> <td data-bbox="799 1072 1137 1099">60.0%</td> <td data-bbox="1142 1072 1481 1099">40.0%</td> </tr> </tbody> </table>			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%
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Multimedia assisted oral presentation	60.0%	20.0%													
Laboratory mark	60.0%	40.0%													
Recommended reading	Basic literature	K. W. Kolasinski: Surface Science - Foundations of Catalysis and Nanoscience													
	Supplementary literature	G. Bracco, B. Hols: Surface Science Techniques													
	eResources addresses	Adresy na platformie eNauczanie:													
Example issues/ example questions/ tasks being completed	<p>Definition of surface energy and surface tension.</p> <p>Discussion of the surface influence on semiconductor band structure.</p> <p>Surface effects in technology.</p> <p>Adsorption process description.</p> <p>Analysis of reasons of the segregation effect in alloys.</p>														
Work placement	Not applicable														

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