



Subject card

Subject name and code	Surface Science, PG_00020923						
Field of study	Nanotechnology						
Date of commencement of studies	October 2021	Academic year of realisation of subject			2023/2024		
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	3	Language of instruction			Polish		
Semester of study	5	ECTS credits			2.0		
Learning profile	general academic profile	Assessment form			assessment		
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	dr hab. inż. Jacek Ryl					
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	15.0	30
	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	30	1.0	19.0	50		
Subject objectives	The goal of the subject is the presentation of basic problems resulting from the existence of interface between material objects and its surroundings. Discussion of the consequences arising from the existence of surface energy. Analysis of possible applications of surface phenomena in technology. Understanding of problems and benefits resulting from decreasing dimensions of objects with the special emphasis on the semiconductor band structure modification resulting from the surface charge distribution.						
Learning outcomes	Course outcome	Subject outcome			Method of verification		
	K6_U01	Is able to use databases to develop literature issues regarding broadly understood surface physicochemistry.			[SU1] Assessment of task fulfilment		
	K6_K05	Is capable of analysing a scientific publication in English and on its basis prepare an oral presentation in Polish.			[SK3] Assessment of ability to organize work [SK4] Assessment of communication skills, including language correctness		
	K6_U02	Can analyze influence of various phenomena on each other and surface physicochemistry importance.			[SU2] Assessment of ability to analyse information		
	K6_W03	Has systematic knowledge in scope of all branches of general physics.			[SW1] Assessment of factual knowledge		
	K6_W07	Knows the challenges and benefits resulting from the progressive miniaturization of components and devices, with particular emphasis on the impact of surface phenomena			[SW1] Assessment of factual knowledge		

Subject contents	<p>Introduction - ideal and real surface.</p> <p>Surface crystallography.</p> <p>Surface relaxation and reconstruction.</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>Friction - dry friction theories, boundary friction.</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 1028 794 1057">Subject passing criteria</th> <th data-bbox="799 1028 1137 1057">Passing threshold</th> <th data-bbox="1142 1028 1481 1057">Percentage of the final grade</th> </tr> </thead> <tbody> <tr> <td data-bbox="456 1064 794 1093">Written work</td> <td data-bbox="799 1064 1137 1093">50.0%</td> <td data-bbox="1142 1064 1481 1093">50.0%</td> </tr> <tr> <td data-bbox="456 1099 794 1144">Multimedia assisted oral presentation</td> <td data-bbox="799 1099 1137 1144">50.0%</td> <td data-bbox="1142 1099 1481 1144">50.0%</td> </tr> </tbody> </table>			Subject passing criteria	Passing threshold	Percentage of the final grade	Written work	50.0%	50.0%	Multimedia assisted oral presentation	50.0%	50.0%
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Multimedia assisted oral presentation	50.0%	50.0%										
Recommended reading	<p>Basic literature</p> <p>Supplementary literature</p> <p>eResources addresses</p>	<p>K. W. Kolasinski: Surface Science - Foundations of Catalysis and Nanoscience</p> <p>G. Bracco, B. Hols: Surface Science Techniques</p> <p>Adresy na platformie eNauczenie: Fizykochemia Powierzchni - 23/24 - Moodle ID: 30872 https://enauczenie.pg.edu.pl/moodle/course/view.php?id=30872</p>										
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											