GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Surface Science, PG_00061910		
Field of study	Materials Engineering		
Date of commencement of studies	October 2024	Academic year of realisation of subject	2025/2026
Education level	first-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	2	Language of instruction	Polish
Semester of study	4	ECTS credits	2.0
Learning profile	general academic profile	Assessment form	assessment
Conducting unit	Division of Electrochemistry and Surface Physical Chemistry -> Institute of Nanotechnology and Materials Engineering -> Faculty of Applied Physics and Mathematics -> Faculties of Gdańsk University of Technology		
Name and surname of lecturer (lecturers)	Subject supervisor	prof. dr hab. inż. Jacek Ryl	
	Teachers	prof. dr hab. inż. Jacek Ryl	

Lesson types

Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
Number of study hours	15.0	0.0	15.0	0.0	0.0	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	2.0	18.0	50

Subject objectives

The goal of the subject is the presentation of basic problems resulting from he 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_K01] Understands the need to improve professional and personal competencies; is conscious of own limitations and knows when to turn to experts, properly establishes priorities helping to accomplish tasks defined by oneself or others.	The student understands the need to follow the continuous development of material technologies and is able to analyze cause-and-effect relationships.	[SK3] Assessment of ability to organize work
[K6_U02] Can operate typical laboratory equipment and analyze material tests	The student is able to operate selected equipment typical for conducting research in the area of surface physicochemistry.	[SU4] Assessment of ability to use methods and tools [SU3] Assessment of ability to use knowledge gained from the subject

Subject contents	Course content – lecture Introduction - ideal and real surface. Crystallography of surfaces. Surface tension and thermodynamic description of surfaces. Physical adsorption. Chemisorption and its effect on surface properties. Physics of semiconductor surfaces. Electric double layer Phenomena in colloidal systems, micelles Surface phenomena in industrial technologies (flotation, detergents, etc.). Natural and artificial coatings Selected technologies for producing thin films. During the laboratory, selected aspects related to the above areas will be discussed: Nanoscale topography measurements Study of hydrophilic properties Study of adsorption processes Synthesis of catalytic nanoparticles Study of catalytic properties Electrode processes
Prerequisites and co-requisites	

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
entry test / reports	60.0%	50.0%
Written work	60.0%	50.0%

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	

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.
Practical activites within the subject	Not applicable

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