GDAŃSK UNIVERSITY OF TECHNOLOGY

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 -> Wydziały Politechniki Gdańskiej		
Name and surname of lecturer (lecturers)	Subject supervisor	prof. dr hab. inż. Jacek Ryl	
	Teachers	prof. dr hab. inż. Jacek Ryl Angelika Łepek dr inż. Piotr Okoczuk prof. dr hab. inż. Barbara Kościelska	

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

eNauczanie source addresses:

Moodle ID: 950 Fizykochemia powierzchni (TP5)
https://enauczanie.pg.edu.pl/2025/course/view.php?id=950

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

<table>
<tr><td>Subject contents</td><td>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.</td></tr>
<tr><td>Prerequisites and co-requisites</td><td></td></tr>
<tr><td>Assessment methods and criteria</td><td>
<table>
<tr><th>Subject passing criteria</th><th>Passing threshold</th><th>Percentage of the final grade</th></tr>
<tr><td>Exam</td><td>60.0%</td><td>40.0%</td></tr>
<tr><td>Multimedia assisted oral presentation</td><td>60.0%</td><td>20.0%</td></tr>
<tr><td>Laboratory mark</td><td>60.0%</td><td>40.0%</td></tr>
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<tr><td>Recommended reading</td><td>
<table>
<tr><td>Basic literature</td><td>K. W. Kolasinski: Surface Science - Foundations of Catalysis and Nanoscience</td></tr>
<tr><td>Supplementary literature</td><td>G. Bracco,B. Hols: Surface Science Techniques</td></tr>
<tr><td>eResources addresses</td><td></td></tr>
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<tr><td>Example issues/ example questions/ tasks being completed</td><td>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.</td></tr>
<tr><td>Work placement</td><td>Not applicable</td></tr>
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