GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Surface Science, PG_00039755		
Field of study	Materials Engineering, Materials Engineering, Materials Engineering		
Date of commencement of studies	October 2021	Academic year of realisation of subject	2023/2024
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	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	5.0	15.0	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_U07	Is able to perform research in the literature on topic of broadly understood surface physicochemistry. .	[SU3] Assessment of ability to use knowledge gained from the subject [SU2] Assessment of ability to analyse information
K6_W08	Understands the benefits and drawbacks of the ongoing miniaturisation of electronic components. He understands the increasing role played by the surface phenomena.	[SW1] Assessment of factual knowledge
K6_W07	Understands the role played by the surface and its influence on the materials properties. Understands physics of such processes as flotation, detergention, catalysis. Understands the role played by the surface charge layer in modification of band structure of semiconductors.	[SW1] Assessment of factual knowledge
K6_K01	Understands the necessity of studying more in depth many complementary fields of science, necessary to understand the surface phenomena.	[SK2] Assessment of progress of work
K6_U09	Analyses the scientific publication and prepares the oral presentation explaining main issues discussed in the paper.	[SU5] Assessment of ability to present the results of task [SU2] Assessment of ability to analyse information

<table>
<tr><td>Subject contents</td><td>Introduction - ideal and real surface.

Surface crystallography.

Surface relaxation and reconstruction.

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.).

Friction - dry friction theories, boundary friction.

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>Multimedia assisted oral presentation</td><td>50.0%</td><td>50.0%</td></tr>
<tr><td>Written work</td><td>50.0%</td><td>50.0%</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>Adresy na platformie eNauczanie:
Fizykochemia Powierzchni - 23/24 - Moodle ID: 30872
https://enauczanie.pg.edu.pl/moodle/course/view.php?id=30872</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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