



## Subject card

Subject name and code	, PG_00058700						
Field of study	Materials Engineering, Materials Engineering, Materials Engineering						
Date of commencement of studies	February 2023		Academic year of realisation of subject			2022/2023	
Education level	second-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	1		Language of instruction			Polish	
Semester of study	1		ECTS credits			2.0	
Learning profile	general academic profile		Assessment form			assessment	
Conducting unit	Department of Electrochemistry, Corrosion and Materials Engineering -> Faculty of Chemistry						
Name and surname of lecturer (lecturers)	Subject supervisor		dr hab. inż. Andrzej Miszczyk				
	Teachers		dr hab. inż. Andrzej Miszczyk				
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	15.0	0.0	30.0	0.0	0.0	45
	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	45		1.0		4.0	50
Subject objectives	learning the basic galvanic technologies, properties of galvanic coatings and their corrosion resistance in various environments						
Learning outcomes	Course outcome	Subject outcome			Method of verification		
	K7_U01	student is able to obtain information from various sources, integrate it with his own knowledge by interpreting it and presenting his own opinions in relation to the performed laboratory tasks			[SU4] Assessment of ability to use methods and tools [SU2] Assessment of ability to analyse information [SU1] Assessment of task fulfilment		
	K7_W04	student has knowledge of understanding the resistance of specific metal coatings in a specific environment as a result of their chemical composition and structure			[SW1] Assessment of factual knowledge		
	K7_K02	student is able to predict the consequences of their actions in terms of their impact on the environment and human safety			[SK5] Assessment of ability to solve problems that arise in practice [SK1] Assessment of group work skills		
	K7_W06	student knows the theoretical basis of electroplating processes and the scientific equipment used to study them in terms of material properties			[SW1] Assessment of factual knowledge		
	K7_U04	student is able to analyze in detail the obtained data and present them in the form of a report or presentation in both Polish and English			[SU2] Assessment of ability to analyse information [SU5] Assessment of ability to present the results of task		

Subject contents	<p>Basic electroplating concepts. Electrochemistry of coating deposition processes. Surface preparation for galvanic coatings. Types of galvanic coatings. Selection of galvanic coatings. Chemical and electrochemical polishing. Single and multi-layer coatings. Chrome plating. Tin plating. Copper plating. Nickel plating. silvering. Gilding. Alloy coatings. Conversion coatings: phosphate, chromating. Aluminum anodizing and coloring. Steel oxidation. Galvanic coating on plastics: electroplating. Technological process diagrams. Evaluation of the quality of galvanic baths and the quality of galvanic coatings. Ecological problems in the electroplating plant: water management and wastewater treatment. Health and safety in electroplating plant.</p>		
Prerequisites and co-requisites	<p>knowledge of the basics of electrochemistry, knowledge of the basics of metal corrosion, knowledge of the basics of physical chemistry</p>		
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	final test	60.0%	60.0%
	Laboratory exercises	100.0%	40.0%
Recommended reading	Basic literature	<p>Galvanic technique handbook, collective work WNT 2004A. Wirbilis - Electroplating for craftsmen, WNT 1986 Electroplating: basic principles, processes and practice By Nasser Kanani, Elsevier 2004.</p>	
	Supplementary literature	<p>Modern Electroplating, Mordechai Schlesinger, Milan Paunovic · 2011</p>	
	eResources addresses	<p>Podstawowe  <a href="https://www.explainthatstuff.com/electroplating.html">https://www.explainthatstuff.com/electroplating.html</a> - practical aspects of galvanic coatings  <a href="https://chem.libretexts.org/Bookshelves/Analytical_Chemistry/Supplemental_Modules_(Analytical_Chemistry)/Electrochemistry/Electrolytic_Cells/Electroplating">https://chem.libretexts.org/Bookshelves/Analytical_Chemistry/Supplemental_Modules_(Analytical_Chemistry)/Electrochemistry/Electrolytic_Cells/Electroplating</a> - description of the theoretical side of galvanic processes          Uzupełniająca  <a href="https://www.google.com/search?tbm=bks&amp;q=electroplating">https://www.google.com/search?tbm=bks&amp;q=electroplating</a> - books on electroplating</p>	
Example issues/ example questions/ tasks being completed	<p>corrosion resistance of zinc coatings in various environments; anodic and cathodic coatings, Watt's bath, conversion coatings - types and their role</p>		
Work placement	<p>Not applicable</p>		