



Subject card

Subject name and code	Environment protection, PG_00020943						
Field of study	Nanotechnology						
Date of commencement of studies	October 2023		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	1		Language of instruction		Polish		
Semester of study	1		ECTS credits		1.0		
Learning profile	general academic profile		Assessment form		assessment		
Conducting unit	Zakład Elektrochemii i Fizykochemii Powierzchni -> Instytut Nanotechnologii i Inżynierii Materiałowej -> 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	0.0	15
	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	15		1.0		9.0	25
Subject objectives	Make students aware of the impact of human productive activity on the natural environment. Overview of the principles of sustainable development. Presentation of the role of engineers in developing tools and technologies allowing for more effective environment protection.						
Learning outcomes	Course outcome		Subject outcome		Method of verification		
	[K6_K71] is conscious of the need to apply knowledge from humanistic, social, economic or legal sciences in order to function in a social environment		the student understands the role of engineering and modern technologies to ensure sustainable development		[SK5] Assessment of ability to solve problems that arise in practice		
	K6_U10		The student is aware of the impact of nanomaterials on the environment at every stage of the life cycle		[SU5] Assessment of ability to present the results of task		
Subject contents	Human impact on the environment. Types and sources of water, soil and air pollution. Circulation of resources in the environment. Global, local and point environmental threats.Evolution of environmental protection. Environmental protection strategies: conservative, technological and planning.The idea of sustainable development. The role of material engineers in shaping changes, designing materials and technological processes.Available sources of energy, their harmfulness to the natural environment, materials and technologies related to obtaining energy, energy efficiency of processes.Maximizing the efficiency of using energy, time, mass and space.Principles of green chemistry, toxicity and biodegradability of materials, Protection against corrosion.Circular economy. Recycling. Process automation (drivers, management systems, monitoring).						
Prerequisites and co-requisites							

Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Writing test	60.0%	60.0%
	oral presentation	60.0%	40.0%
Recommended reading	Basic literature	1. J. Krystek, Ochrona środowiska dla inżynierów, PWN 2018 2. M. Popkiewicz i inni, Nauka o klimacie, Wydawnictwo Nieoczywiste, 2019 3. W. Adamczyk; Ekologia wyrobów; PWE 2004 4. Z. Kowalski, J. Kulczyńska, M. Góralczyk; Ekologiczna ocena cyklu życia procesów wytwórczych (LCA), PWN 2007 5. K. Małachowski; Gospodarka a środowisko i ekologia, CeDeWu, 2011 6. Z. Wnuk; Ekologia i ochrona środowiska. Wybrane zagadnienia., Wydawnictwo Uniwersytetu Rzeszowskiego, 2011	
	Supplementary literature	JCR articles	
	eResources addresses	Adresy na platformie eNauczanie: Ochrona Środowiska 23/24 - Moodle ID: 30873 https://enauczanie.pg.edu.pl/moodle/course/view.php?id=30873	
Example issues/ example questions/ tasks being completed	The life cycle of the selected product.		
	Types of impacts on the environment at the stage of manufacture of the selected material.		
	The use of ecodesign principles on the example of the selected product.		
Work placement	Not applicable		