



Subject card

Subject name and code	New material technologies, PG_00063622						
Field of study	Materials Engineering						
Date of commencement of studies	October 2026	Academic year of realisation of subject				2027/2028	
Education level	second-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	4	ECTS credits				2.0	
Learning profile	general academic profile	Assessment form				assessment	
Conducting unit	Faculty of Applied Physics and Mathematics -> Faculties of Gdańsk University of Technology						
Name and surname of lecturer (lecturers)	Subject supervisor	dr hab. inż. Aleksandra Mielewczyk-Gryń					
	Teachers	dr hab. inż. Aleksandra Mielewczyk-Gryń dr hab. inż. Łukasz Piszczyk					
Lesson types	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	30.0	0.0	0.0	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	3.0		17.0	50	
Subject objectives	The course aims to develop the ability to analyze and evaluate modern technologies for material manufacturing, processing, and modification, as well as to understand their applications in various industrial sectors. Students will gain knowledge about innovative materials, research methods, and sustainable development in the context of materials engineering. Moreover, the course fosters the ability to critically assess available technologies and select optimal solutions for specific engineering applications.						
Learning outcomes	Course outcome	Subject outcome			Method of verification		
	[K7_U01] Can obtain information from literature, databases and other properly selected sources, also in English; can integrate the obtained information, interpret and draw conclusions, formulate and justify opinions	Able to acquire information from literature, databases, and other appropriately selected sources, including in English. Can analyze and integrate the obtained data, interpret it, draw conclusions, and formulate and justify opinions.			[SU2] Assessment of ability to analyse information		
	[K7_W07] Has knowledge of the development trends and most important new achievements of the fields of science and scientific disciplines relevant to materials engineering and related disciplines.	Knows developmental trends and key innovations in science and disciplines related to materials engineering and associated scientific areas.			[SW1] Assessment of factual knowledge		
	[K7_K01] Understands the need for lifelong learning, can inspire and organize the learning process of others. Is aware of own limitations and knows when to turn to experts, can accurately determine priorities helping to achieve the tasks specified by themselves or others.	Understands the importance of lifelong learning, can motivate and support others in their learning process. Aware of their limitations, knows when to seek advice from experts. Able to set priorities effectively to successfully accomplish tasks, both their own and those assigned by others.			[SK5] Assessment of ability to solve problems that arise in practice [SK1] Assessment of group work skills		

Subject contents	<p>Course content – lecture The subject's scope focuses on the latest development trends in the field of materials engineering, with particular emphasis on their practical applications in various industrial sectors. The discussed topics cover both modern materials manufacturing and processing technologies, as well as innovative approaches to designing structures with unique properties.</p> <p>The course analyzes contemporary trends in materials engineering, such as the development of nanomaterials, smart adaptive materials, and ecological alternatives supporting sustainable development. Special attention is also given to materials used in strategic sectors such as automotive, aerospace, energy, electronics, and medicine.</p> <p>Additionally, students will familiarize themselves with methods for testing and evaluating material properties and the challenges associated with implementing these materials in industrial conditions. The course also includes case studies of real-world applications of modern materials technologies, providing a better understanding of the impact of innovations on technological and economic development.</p> <p>Sample topics include:</p> <ul style="list-style-type: none"> • The fundamentals of materials engineering in a historical context analysis of the evolution of materials from prehistoric times to the present, with particular attention to groundbreaking discoveries and innovations that contributed to the development of modern materials technologies. This includes the development of metals, ceramics, polymers, and composites and their applications in different eras. • Energy modern materials used in energy production, including renewable energy sources such as photovoltaics, wind turbines, and fuel cells, with special emphasis on the hydrogen economy and the entire value chain. • New consumer solutions innovative materials used in consumer electronics, medicine, smart textiles, and biocompatible implants. • Materials for the military, aerospace, and transportation sectors the development of modern composites, light metal alloys, and materials resistant to extreme environmental conditions. • New current trends based on the latest scientific publications. <p>The course program covers all classes of materials, including ceramic and polymer materials.</p>		
Prerequisites and co-requisites			
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	final test	50.0%	100.0%
Recommended reading	Basic literature	Energy materials / ed. by Duncan W. Bruce, Dermont O'Hare, Richard I. Walton. Bruce, Duncan W. Red. O'Hare, Dermot. Red. Walton, Richard I. Red. 2011	
	Supplementary literature	Advances in polymer friction and wear / edited by Lieng-Huang Lee. American Chemical Society International Symposium on Advances in Polymer Friction and Wear (1974 : Los Angeles)	
	eResources addresses		
Example issues/ example questions/ tasks being completed	<ul style="list-style-type: none"> • Provide examples of the application of transparent ceramics. • What are the causes of hydrogen embrittlement in pipelines? • What are the examples of the application of polymer materials in modern sports products? 		
Practical activities within the subject	Not applicable		

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