

。 GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Advanced welding processes, PG_00064855									
Field of study	Mechanical Engineering									
Date of commencement of studies	February 2025		Academic year of realisation of subject			2025/2026				
Education level	second-cycle studies		Subject group			Specialty 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	2		ECTS credits			3.0				
Learning profile	general academic profile		Assessment form			assessment				
Conducting unit	Zakład Technologii M Technology -> Facult	jii Materiałów Konstrukcyjnych i Spajania -> Institute of Manufacturing and Materials aculty of Mechanical Engineering and Ship Technology					laterials			
Name and surname	Subject supervisor	Subject supervisor dr hab.			hab. inż. Grzegorz Rogalski					
of lecturer (lecturers)	Teachers			1						
Lesson types and methods	Lesson type	Lecture	Tutorial	Laboratory	Projec	t	Seminar	SUM		
of instruction	Number of study hours	15.0	0.0	15.0	15.0		0.0	45		
	E-learning hours inclu	ided: 0.0								
Learning activity and number of study hours	Learning activity	Participation in classes includ	n didactic led in study	Participation in consultation hours		Self-study		SUM		
	Number of study hours	45		5.0		25.0		75		
Subject objectives	The aim of the course is to familiarize students with advanced bonding processes. The topics covered include the physical foundations of the processes discussed, the relationships between the basic variables and their influence on the obtained properties of bonded joints, technological guidelines and areas of their implementation									
Learning outcomes	Course outcome		Subject outcome			Method of verification				
	[K7_W11] interprets social, economic, legal (including industrial and intellectual property laws), and other non-technical aspects of engineering activities, and includes them into engineering practice		The student is aware of the impact of non-technical aspects of advanced bonding processes on the surrounding environment and knows the risks of their implementation			[SW3] Assessment of knowledge contained in written work and projects [SW1] Assessment of factual knowledge				
	[K7_U13] evaluates the feasibility and potential for utilizing new technical and technological achievements in accomplishing tasks characteristic for the field of study		The student has structured technical knowledge in the field of advanced joining processes. He is able to take into account aspects related to the theoretical foundations of Mechanics and Machine Design (production, modeling of continuous and discrete technological processes) when selecting a process			[SU3] Assessment of ability to use knowledge gained from the subject [SU2] Assessment of ability to analyse information				
Subject contents	[K7_W01] explains and describes, on the basis of general knowledge of the scientific disciplines forming the theoretical basis of Mechanics and Mechanical Engineering, the structure and principles of operation of mechanical systems and processes		The student is able to explain and describe advanced joining technologies taking into account information that forms the theoretical foundations of Mechanics and Machine Design, e.g. issues related to the modification of technological and mechanical processes, etc.			[SW2] Assessment of knowledge contained in presentation [SW1] Assessment of factual knowledge				
	beam welding. Hybrid welding. Solid state bonding. Vacuum brazing. Developments of standard welding processes that allow for increased efficiency and quality of the joints made, e.g. orbital welding, deep penetration welding, tandem welding and others.									

Prerequisites and co-requisites	Basic knowledge of welding processes						
Assessment methods	Subject passing criteria	Passing threshold	Percentage of the final grade				
and criteria		60.0%	25.0%				
		60.0%	25.0%				
		60.0%	50.0%				
Recommended reading	Basic literature	Pilarczyk J. (red.): Poradnik inżyniera. Spawalnictwo. tom I. Wydawnictwo Naukowe PWN, Warszawa. Pilarczyk J. (red.): Poradnik inżyniera. Spawalnictwo. tom II Wydawnictwo Naukowe PWN, Warszawa. Chmielewski T., Zembaty Z.: Projektowanie procesów technologicznych. Spawalnictwo Oficyna Wydawnicza Politechniki9 Warszawskiej 2013 Nowacki J.: Lutowanie w budowie maszyn. wydawnictwo WNT. 2017					
	Supplementary literature	Klimpel A.: Technologie laserowe. Spawanie, napawanie, stopowanie, obróbka cieplna i cięcie. Wydawnictwo Politechniki Śląskiej, Gliwice Klimpel A.: Nowoczesne lasery i technologie laserowe w inżynierii spawalnictwa. Wydawnictwo Politechniki Śląskiej, Gliwice 2023					
	eResources addresses	Adresy na platformie eNauczanie:					
Example issues/ example questions/ tasks being completed	Explain the differences between the joining processes, i.e. welding, brazing, soldering, gluing Characterize the vacuum brazing process, provide its stores and description						
	3. Describe the physical phenomena characteristic of the plasma welding process						
	4. Explain the influence of the fundamental variables of the laser welding process on the geometry of the weld						
	5. Describe and explain the principle of operation of the TIG welding process with deep penetration						
	6. Provide the differences between the MIG/MAG and FCAW welding processes, specify the method of droplet transfer to the liquid metal pool for each method.						
	7. Provide the parameters of stir welding (FSW) and their influence on the construction of the joint						
Work placement	Not applicable						

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