



## Subject card

Subject name and code	Material behaviour during joining , PG_00050174						
Field of study	Mechanical 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	Part-time studies	Mode of delivery			at the university		
Year of study	3	Language of instruction			Polish		
Semester of study	6	ECTS credits			4.0		
Learning profile	general academic profile	Assessment form			exam		
Conducting unit	Institute of Manufacturing and Materials Technology -> Faculty of Mechanical Engineering and Ship Technology						
Name and surname of lecturer (lecturers)	Subject supervisor		dr hab. inż. Dariusz Fydrych				
	Teachers		dr hab. inż. Dariusz Fydrych				
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	15.0	0.0	15.0	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	8.0		62.0	100	
Subject objectives	Obtaining of knowledge of weldability of stel and nonferrous metals						
Learning outcomes	Course outcome		Subject outcome		Method of verification		
	[K6_W03] possesses and is able to practically apply the knowledge on the construction, properties and testing methods of construction materials		Student recognize the structural materials and their operating properties		[SW1] Assessment of factual knowledge		
	[K6_U10] is able to formulate the principles of selecting a material for a construction, ensuring the correct operation of a device		Student can choose the method of joining (welding, resistance welding, soldering) for a group of materials, properties of estimate and develop the technical specification		[SU1] Assessment of task fulfilment		
Subject contents	LECTURE						
	Weldability. The phenomena of cracking during the welding process. Hot, cold, lamellar and reheat cracks. Weldability of alloy steels. Characteristics of consumables. Thermal field, thermal cycle. Crystallization of the weld metal. Metallurgical reactions and slag properties. Design of the weld metal. Heat affected zone. CTP and CTPcs charts. The concept of t8/5. Weldability of ferrous and nonferrous alloys.						
	LABORATORY						
	Determination of susceptibility of steel to hot and cold cracking. Evaluation of weldability of mild and high alloyed steels. Determination of diffusible hydrogen content in deposited metal.						
Prerequisites and co-requisites	Basic knowledge of materials science, chemistry, theory of thermal processes, welding processes						
Assessment methods and criteria	Subject passing criteria		Passing threshold		Percentage of the final grade		
	laboratory test		60.0%		40.0%		
	test		60.0%		60.0%		

Recommended reading	Basic literature	1. Tasak E.: Spawalność stali. Wyd. Fotobit, Kraków, 2002. 2. Praca zbiorowa: Poradnik Inżyniera - Spawalnictwo. WNT, Warszawa, 2003. 3. Tasak E.: Metalurgia spawania. Wyd. Jak, Kraków, 2008.
	Supplementary literature	1. Jakubiec M., Lesiński K., Czajkowski H.: Technologia konstrukcji spawanych. WNT Warszawa 1987.  2. Pilarczyk J., Pilarczyk J.: Spawanie i napawanie elektryczne metali. Wydawnictwo Śląsk Katowice 1996.
	eResources addresses	
Example issues/ example questions/ tasks being completed	Describe weldability of heat resistant steel.  Describe weldability of stainless steel.  Describe weldability of aluminium alloys.	
Work placement	Not applicable	