

GDAŃSK UNIVERSITY

Subject card

Subject name and code	Materials and Testing of Welded Structures, PG_00062999								
Field of study	Management and Production Engineering								
Date of commencement of studies	February 2023		Academic year of realisation of subject			2023/2024			
Education level	second-cycle studies		Subject gro	oup					
Mode of study	Full-time studies		Mode of de	livery		at the i	university		
Year of study	2		Language of	of instruction	n	English	n		
Semester of study	3		ECTS credits			2.0			
Learning profile	general academic profile		Assessment form			assessment			
Conducting unit	Institute of Manufacturing and Materials Technology -> Faculty of Mechanical Engineering and Ship Technology								
Name and surname	Subject supervisor		Balazs Varbai						
of lecturer (lecturers)	Teachers		Balazs Varbai						
Lesson types and methods	Lesson type	Lecture	Tutorial	Laboratory	Project	t	Seminar	SUM	
of instruction	Number of study hours	30.0	0.0	0.0	0.0		0.0	30	
	E-learning hours inclu	uded: 0.0							
Learning activity and number of study hours	Learning activity	rning activity Participation ir classes includ plan		1 didactic Participation in consultation hours		Self-study SUM			
	Number of study hours	30		0.0		0.0		30	
Subject objectives	The aim of the course is to familiarize students with the behavior of welded structures during welding processes and methods of assessing the quality of joints.								
Learning outcomes	Course out	come	Subj	ect outcome		Method of verification			
	[K7_W81] has knowledge of complex grammatical structures and diverse lexical resources needed to communicate in foreign language in terms of general and specialist language related to field of study		The student can use technical vocabulary in a foreign language			[SW3] Assessment of knowledge contained in written work and projects			
	[K7_U82] is able to proficiently obtain and process information related to field of study and academic environment in foreign language at B2+ level of the Common European Framework of Reference for Languages (CEFR)		The student is able to search and use English-language sources of information.			[SU2] Assessment of ability to analyse information			
	[K7_K81] is able to cooperate in international team at her/his own university, during work placement and during study abroad		The student is able to work in a group.			[SK1] Assessment of group work skills			
	[K7_K82] is equipped to participate actively in lectures, seminars and laboratory classes conducted in foreign language		The student has engineering communication skills			[SK4] Assessment of communication skills, including language correctness			

Subject contents	Definition of weldability, parts of a welded joint, terminology					
	Solidification of the weld metal					
	Gas-metal, slag-metal reactions, weld pool flows					
	Hot cracking: solidification and liquation cracks, mechanism, prevention, hot cracking testing					
	Cold cracking: mechanism, prevention, cold cracking testing					
	Lamellar tearing: mechanism, prevention, lamellar tearing testing					
	Classification of metallic materials according to ISO/TR 15608					
	Carbon steels and weathering steels: grades, properties of the weld metal, heat affected zone, appropriate welding procedures, filler materials, post-processing					
	High strength steels: grades, properties of the weld metal, heat affected zone, appropriate welding procedures, filler materials, post-processing					
	Steels for elevated temperatures: grades, properties of the weld metal, heat affected zone, appropriate welding procedures, filler materials, post-processing					
	Steels for cryogenic applications: grades, properties of the weld metal, heat affected zone, appropriate welding procedures, filler materials, post-processing					
	Introduction to corrosion: chemical and electrochemical corrosion, corrosion types, prevention, corrosion testing					
	Stainless steels: grades, properties of the weld metal, heat affected zone, appropriate welding procedures, filler materials, post-processing, ferrite content measurement					
	Cast irons and steels: grades, properties of the weld metal, heat affected zone, appropriate welding procedures, filler materials, post-processing					
	Aluminum and its alloys: grades, properties of the weld metal, heat affected zone, appropriate welding procedures, filler materials, post-processing					
	Nickel and its alloys: grades, properties of the weld metal, heat affected zone, appropriate welding procedures, filler materials, post-processing					
	Titanium and its alloys: grades, properties of the weld metal, heat affected zone, appropriate welding procedures, filler materials, post-processing					
	Weld imperfections ISO 6520 and ISO 5817					
	Destructive testing methods: Impact and tensile testing of welded joints					
	Bending and fracture testing of welded joints					
	Macro- and microscopic examination, hardness testing of welded joints					
	Non-destructive testing methods: visual testing					

	Liquid penetrant and magnetic particle inspection testing of welded joints						
	Ultrasonic and radiographic testing of welded joints						
Prerequisites and co-requisites							
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade				
	test	60.0%	100.0%				
Recommended reading	Basic literature	 Lippold, J. C., & Kotecki, D. J. (2005). Welding metallurgy and weldability of stainless steels. Harvard. Bailey, N. (1994). Weldability of ferritic steels. Elsevier. Chen, C. H. (2007). Ultrasonic and advanced methods for nondestructive testing and material characterization. World Scientific. 					
	Supplementary literature	Google Scholar articles					
	eResources addresses	Adresy na platformie eNauczanie:					
Example issues/ example questions/ tasks being completed	Describe the weldability of corrosion-resistant steel.Describe the weldability of aluminum alloys.Characterize the welding thermal cycle.						
Work placement	Not applicable						