GDAŃSK UNIVERSITY OF TECHNOLOGY

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 group	
Mode of study	Full-time studies	Mode of delivery	at the university
Year of study	2	Language of instruction	English
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 of lecturer (lecturers)	Subject supervisor	Balazs Varbai	
	Teachers	Balazs Varbai	

Lesson types and methods of instruction

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	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 outcome	Subject 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

<table>
<tr><td></td><td>Liquid penetrant and magnetic particle inspection testing of welded joints

Ultrasonic and radiographic testing of welded joints</td></tr>
<tr><td>Prerequisites and co-requisites</td><td></td></tr>
<tr><td>Assessment methods and criteria</td><td>
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<tr><th>Subject passing criteria</th><th>Passing threshold</th><th>Percentage of the final grade</th></tr>
<tr><td>test</td><td>60.0%</td><td>100.0%</td></tr>
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<tr><td>Recommended reading</td><td>
<table>
<tr><td>Basic literature</td><td>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.</td></tr>
<tr><td>Supplementary literature</td><td>Google Scholar articles</td></tr>
<tr><td>eResources addresses</td><td>Adresy na platformie eNauczanie:</td></tr>
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<tr><td>Example issues/ example questions/ tasks being completed</td><td>Describe the weldability of corrosion-resistant steel.Describe the weldability of aluminum alloys.Characterize the welding thermal cycle.</td></tr>
<tr><td>Work placement</td><td>Not applicable</td></tr>
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