GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Materials science in welding, PG_00055248		
Field of study	Management and Production Engineering		
Date of commencement of studies	October 2024	Academic year of realisation of subject	2026/2027
Education level	first-cycle studies	Subject group	Optional 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	3	Language of instruction	Polish
Semester of study	6	ECTS credits	3.0
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		

Lesson types and methods of instruction

Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
Number of study hours	30.0	0.0	15.0	0.0	0.0	45

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	45	4.0	26.0	75

Subject objectives

The aim of the course is to provide the students with knowledge of weldability of materials

Learning outcomes

Course outcome	Subject outcome	Method of verification
[K6_K01] feels the need for self-realization by learning throughout life, is looking for modern and innovative solutions in their actions, is able to think creatively and act in an entrepreneurial way	Student can choose the method of joining (welding, resistance welding, soldering, brazing) for a group of materials, properties of estimate and develop the technical specifications	[SK1] Assessment of group work skills [SK5] Assessment of ability to solve problems that arise in practice [SK4] Assessment of communication skills, including language correctness [SK3] Assessment of ability to organize work
[K6_W02] has knowledge of materials, their properties and research methods, including construction materials used in the machinery industry, has ordered, theoretically founded knowledge of mechanics including modeling of mechanical systems in the field of statics, kinematics and dynamics, and has an ordered, theoretically founded knowledge in the field of strength analysis materials and products	Student recognizes structural materials and their operating properties	[SW3] Assessment of knowledge contained in written work and projects [SW1] Assessment of factual knowledge
[K6_U02] has the ability of self-learning and expanding knowledge in a specialized field of engineering production	The student has knowledge of the directions of development of machine construction	[SU4] Assessment of ability to use methods and tools [SU3] Assessment of ability to use knowledge gained from the subject

<table>
<tr><td>Subject contents</td><td>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.</td></tr>
<tr><td>Prerequisites and co-requisites</td><td>MetallographyMathematicsChemistryPhysicsWelding and joining processes</td></tr>
<tr><td>Assessment methods and criteria</td><td><table>
<tr><th>Subject passing criteria</th><th>Passing threshold</th><th>Percentage of the final grade</th></tr>
<tr><td>laboratory test</td><td>60.0%</td><td>40.0%</td></tr>
<tr><td>test</td><td>60.0%</td><td>60.0%</td></tr>
</table></td></tr>
<tr><td>Recommended reading</td><td><table>
<tr><td>Basic literature</td><td>Butnicki S.: Spawalność i kruchość stali. WNT Warszawa 1975.

Tasak E.: Spawalność stali. Fotobit Kraków 2002.

Węgrzyn J.: Fizyka i metalurgia Spawania. Politechnika Śląska 1990.</td></tr>
<tr><td>Supplementary literature</td><td>Praca zbiorowa. Poradnik inżyniera. Spawalnictwo. Tom 1. WNT Warszawa 2003.

Jakubiec M., Lesiński K., Czajkowski H.: Technologia konstrukcji spawanych. WNT Warszawa 1987.

Pilarczyk J., Pilarczyk J.: Spawanie i napawanie elektryczne metali. Wydawnictwo Śląsk Katowice 1996.</td></tr>
<tr><td>eResources addresses</td><td>Adresy na platformie eNauczanie:</td></tr>
</table></td></tr>
<tr><td>Example issues/ example questions/ tasks being completed</td><td>Describe weldability of heat resistant steel.

Describe weldability of stainless steel.

Describe weldability of aluminium alloys</td></tr>
<tr><td>Work placement</td><td>Not applicable</td></tr>
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