GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	, PG_00073764		
Field of study	Mechanical Engineering		
Date of commencement of studies	February 2026	Academic year of realisation of subject	2026/2027
Education level	second-cycle studies	Subject group	
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	Division of Structural Materials Technology and Welding -> Institute of Manufacturing and Materials Technology -> Faculty of Mechanical Engineering and Ship Technology -> Faculties of Gdańsk University of Technology		
Name and surname of lecturer (lecturers)	Subject supervisor	dr hab. inż. Jacek Tomków	
	Teachers		

Lesson types	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	10.0	35.0	75

Subject objectives	The objective of this course is to familiarize students with the technological aspects of electric arc welding processes, which are defined by specific essential variables. Students learn how these essential variables influence structural changes within the weld joint area, as well as the factors that allow for the modification of these changes.

Learning outcomes

Course outcome	Subject outcome	Method of verification
[K7_K71] is able to explain the need to apply knowledge from humanistic, social, economic or legal sciences in order to function in a social environment	The student proposes diagnostic methods for welded structures—with a focus on safe operation, cost-efficiency, and environmental protection—based on the welding technology employed and the application of both non-destructive (NDT) and destructive (DT) testing.	[SK5] Assessment of ability to solve problems that arise in practice
[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 analyzes and solves organizational problems related to the inspection of welded joints, taking into account economic and social aspects as well as technical risks.	[SW3] Assessment of knowledge contained in written work and projects
[K7_U02] formulates and solves technical problems specific to Mechanics and Mechanical Engineering using appropriate tools including CAD and MES systems, and prepares technical documentation	The student is able to prepare a welding procedure specification based on an analysis of the joints in a given structure.	[SU3] Assessment of ability to use knowledge gained from the subject
[K7_W101] is able to make an in-depth identification of key objects and phenomena related to the field of study, as well as theories that describe them and applicable analytical and design methods	The student is able to identify a joining method and plan an appropriate technology for creating joints.	[SW1] Assessment of factual knowledge
[K7_W02] demonstrates a structured and theoretically grounded knowledge of the key topics in Mechanical Engineering enabling the analysis and modelling of mechanical systems, processes and devices	The student is able to define the organizational structure of an enterprise, with a particular focus on areas related to welding processes and quality control. Their knowledge is based on the requirements of relevant standards.	[SW2] Assessment of knowledge contained in presentation

Subject contents

Course content – lecture

The influence of welding process parameters on the quality of joints. Methods for preventing and limiting the occurrence of welding imperfections. The impact of joining technology on the weldability of metallic materials. Thermal processes in welding. The welding thermal cycle and its effect on the properties of joints.

Course content – laboratory

Thermal cycle during welding and joining processes; influence of process parameters on joint geometry; influence of process parameters on joint microstructure; methods for preventing cracks in joints.

Prerequisites and co-requisites

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
Exam/test	51.0%	60.0%
Laboratories	51.0%	40.0%

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 Politechniki Warszawskiej. 2013 Głowacka M., Łabanowski J. Landowski M.: Wpsółczesne materiały inżynierskie. Wybrane grupy amteriałów. Wydawnictwo Politechniki Gdańskiej. 2021 Lancaster J. F.: Metalurgia procesów spawalniczych. WNT W-wa 1967
Supplementary literature	Klimpel A.: Spawanie Zgrzewanie i Cięcie Metali. WNTA Warszawa 1999
eResources addresses	

Example issues/ example questions/ tasks being completed

1. Present the essential variables of the plasma arc welding (PAW) process and their influence on the geometry of welded joints. 2. Describe the structural changes occurring in the welded joint area when welding non-alloy steels. 3. Austenitic structure – characteristics. 4. The Ni-Cr-Fe equilibrium system. 5. Characteristics of electric arc welding processes. 6. Welding thermal cycles – characterization of parameter

Practical activites within the subject

Not applicable

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