GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Bonding of Materials, PG_00039771		
Field of study	Materials Engineering, Materials Engineering, Materials Engineering, Materials Engineering		
Date of commencement of studies	October 2020	Academic year of realisation of subject	2022/2023
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	5	ECTS credits	4.0
Learning profile	general academic profile	Assessment form	assessment
Conducting unit	Department of Materials Engineering and Bonding -> Faculty of Mechanical Engineering and Ship Technology		
Name and surname of lecturer (lecturers)	Subject supervisor	dr hab. inż. Dariusz Fydrych	
	Teachers	mgr inż. Adrian Wolski dr inż. Jacek Haras dr hab. inż. Dariusz Fydrych dr inż. Aleksandra Świerczyńska	

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	5.0	50.0	100

Subject objectives	Obtaining of knowledge about welding and brazing technologies

Learning outcomes

Course outcome	Subject outcome	Method of verification
K6_K01	Student is able to plan and run projects.	[SK5] Assessment of ability to solve problems that arise in practice [SK3] Assessment of ability to organize work [SK2] Assessment of progress of work
K6_U06	Student critically evaluates assumption of various material technologies. Student defines notion: weldability. He differentiates processes of welding and interprets mechanisms of creation of welded joints. Student prepares basic assumptions of welding process and interprets results of quantitative and qualitative tests of evaluation of weldability of metals. Student distinguishes forms of nowedays fabrication materials techniques.	[SU4] Assessment of ability to use methods and tools [SU1] Assessment of task fulfilment
K6_W03	Recognize the constructional materials	[SW1] Assessment of factual knowledge

Subject contents	Lecture Introduction: basic notions. Welding processes. Basics of welding thermal processes, welding thermal cycle. Characteristics and properties of welded joints. Manual metal arc welding. Submerged arc welding. Oxyacetylene welding. Gas metal arc welding (MIG/MAG). Gas tungsten arc welding (TIG). Plasma arc Welding. Laser beam Welding. Electron beam Welding. Resistance welding, Friction Welding, Explosive Welding, Welding of plastics. Soldering and Brazing. Induction soldering, dip soldering, electro-brazing, gas brazing, torch brazing, Furnace brazing. Braze welding. Thermal cutting methods: gas cutting, electro-cutting, plasma arc cutting. Gouging. Water jet cutting. Welding of carbon steels, high strength low alloy steels stainless and heat-resisting steels. Welding of non-ferrous and special metals: aluminum, copper, titanium and its alloys. Quality in welding. Welding defects. Weldability of metals. Definition and methods of evaluation. Residual stresses and welding distortions. Safety of welding work, normalization, ergonomics and economics of welding. Laboratory Manual metal arc welding. Submerged arc welding Gas metal arc welding (MIG/MAG), gas tungsten arc welding (TIG) Bonding of metals Oxyacetylene welding, brazing, thermal cutting, gouging Characteristics and properties of welded joints Evaluation of weldability of steel Inspection of quality of welded joints.
Prerequisites and co-requisites	Knowledge of classification of metals and methods of testing of its properties. Basics of chemistry and metallurgy.
Assessment methods and criteria	

Subject passing criteria	Passing threshold	Percentage of the final grade
test	60.0%	100.0%

Recommended reading	Basic literature	1. Klimpel A.: Technologia spawania i cięcia metali. WNT. Warszawa 1999. 2. Walczak W. (red.): Spawalnictwo. Ćwiczenia laboratoryjne. Wydawnictwo Politechniki Gdańskiej. Gdańsk, 2000. 3. Butnicki S.: Spawalnośc i kruchość stali. Wydawnictwo WNT. Warszawa 1991. 4. Pilarczyk J., Pilarczyk J.: Spawanie i napawanie elektryczne metali. Wydawnictwo Śląsk, Katowice 1996. 5. Dobrzański A.L.:Podstawy nauki o materiałach i materiałoznawstwo. Materiały inżynierskie i podstawy projektowania materiałów. WNT. 2002.
	Supplementary literature	1. Klimpel A.: Napawanie i natryskiwanie cieplne. WNT. Warszawa 2000. 2. Czajkowski H., Walczak W.: Zgrzewanie wybuchowe metali. WNT. Warszawa 1970. 3. Radomski T., Ciszewski A.: Lutowanie. WNT. Warszawa 1971.
	eResources addresses	Adresy na platformie eNauczanie:
Example issues/ example questions/ tasks being completed	Describe selected welding process Describe selected resistance or friction welding process Describe selected brazing process	
Work placement	Not applicable	