



## Subject card

Subject name and code	Quality control of bonds, PG_00055250						
Field of study	Management and Production Engineering						
Date of commencement of studies	October 2022	Academic year of realisation of subject			2024/2025		
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			6.0		
Learning profile	general academic profile	Assessment form			exam		
Conducting unit	Department of Materials Engineering and Bonding -> Faculty of Mechanical Engineering and Ship Technology						
Name and surname of lecturer (lecturers)	Subject supervisor		dr inż. Jacek Haras				
	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	30.0	0.0	75
	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	75		5.0		70.0	150
Subject objectives	Student Learning basic information about the acceptance testing of welded joints.						

Learning outcomes	Course outcome	Subject outcome	Method of verification
	[K6_K02] is able to interact and work in a group, assuming different roles, can inspire and organize the learning process of others, properly identifies priorities for realization of a task specified by themselves or others	[K6_K02]: STUDENT can - cooperate and work in a group, assuming different roles in it: the ordering party or, for example, the controller, he can also - inspire and organize the learning process of other people in the basics of NDT, - adequately sets the priorities for the implementation of the own targets or others.	[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_U04] is able to develop documentation in the area of preparation, implementation and control of production processes in Polish and in a foreign language considered basic for scientific fields, is able to identify and formulate the basic objectives of quality management in the product life cycle, is able to use information and communication techniques appropriate to the implementation of tasks typical in engineering activities including preparation, production and supervision of the manufacturing process	[K6_U04] :STUDENT CAN: - develop documentation in the area of preparation and implementation of NDT tests in Polish and in English, - can identify and formulate the basic targets and effects of NDT tests in the product life cycle (for example: in the welded construction). - can use some techniques in practises.	[SU5] Assessment of ability to present the results of task [SU3] Assessment of ability to use knowledge gained from the subject [SU1] Assessment of task fulfilment
	[K6_W08] has basic management knowledge, including process and product quality management, and detailed knowledge of integrated and standardized quality, environmental, health and safety management systems	K6_W08: STUDENT HAS basic knowledge of NDT testing of products, and detailed knowledge of selected techniques for standardized quality control methods used during acceptance tests.	[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	K6_U02: STUDENT HAS THE ABILITY: - to expand knowledge in the field of specialization: - can list and describe: acceptance tests, - can list defects in metals, forgings and castings as well as welding defects; - has basic knowledge of acceptance criteria (quality levels, test levels and acceptance levels).	[SU5] Assessment of ability to present the results of task [SU4] Assessment of ability to use methods and tools [SU3] Assessment of ability to use knowledge gained from the subject [SU1] Assessment of task fulfilment
Subject contents	Tasks and objectives of welds in the manufacture of welded construction and renovations. Pre-control, current control and final (in service) control. Economic aspects of control methods. Non-destructive testing, destructive testing. Visual Testing (VT). Standardization requirements. The equipment: boroscopes, fiberoscopes, videoscopic sets. Penetrant testing (PT) of welds, castings and forgings. Systems reagents for PT. PT Standards. Magnetic Testing (MT) of welds, castings and forgings. Ways to induce a magnetic field. MT Test-block"s. MT Standards. Radiographic testing (RT) of welds, castings and forgings. Techniques in the radiography of welded joints. Apparatus. Image Quality Indicator"s (IQI). RT Standards. Evaluation of welded joints on the basis of radiographs. Ultrasonic testing (UT) of welds, castings, forgings. Test methods, apparatus and UT Test block"s. UT Standards for testing of welded joints UT. Interpretation of test results. Acceptance criterias in studies UT of welded joints. Ultrasonic thickness measurements (UTT) in metal products. Other methods of NDT: Eddy current (ET). Crack depth measurements using the potential drop. Leakage test (LT). Techniques for research LT welded joints. The method of acoustic emission (AE). Defects (inconsistencies) of welded joints, welded, soldered and glued, and connections with plastic. Corrosion damage into pipelines and power plant components. Non-destructive testing of the machine elements in production lines Classification systems of welding joint"s defectiveness: according to PN-EN ISO Standards, Classification Societies and the Atlas of the International Institute of Welding. Verification system for assessing the deficiency based on the principles of fracture mechanics. Acceptance of welded structures according to standards and regulations in force in different industries.		
Prerequisites and co-requisites	Fundamental knowlege from: construction machine, material-science, technology, electrical engineering and Informatica. Welding Technologies - Part I.		
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Midterm colloquium	75.0%	50.0%
	Practical exercise	100.0%	50.0%

Recommended reading	Basic literature	<ol style="list-style-type: none"> <li>1. Lewicka-Romicka: Podstawy defektoskopii</li> <li>2. Piwowar Kontriola procesów spawalniczych</li> <li>3. Helmslaw NDT Basics</li> <li>3. Pawłowski Z: Badania nieniszczące. Poradnik</li> <li>4. Publikacje - poradniki z dziedziny badań diagnostycznych Biura GAMMA</li> </ol>
	Supplementary literature	Articles from <a href="http://www.ndt.net">www.ndt.net</a>
	eResources addresses	
Example issues/ example questions/ tasks being completed	<ol style="list-style-type: none"> <li>1. Factors affecting THE QUALITY OF THE WELDED JOINTS.</li> <li>2. Factors determining THE ACCEPTANCE CRITERIA for the weldments</li> <li>3. Methods for non-destructive testing of the metal element.</li> <li>4. The welded joint's defects.</li> <li>5. The most common causes of nonconformities (defects) of welded joints.</li> </ol>	
Work placement	Not applicable	