



Subject card

Subject name and code	Non Destructive Testing , PG_00041288						
Field of study	Civil Engineering						
Date of commencement of studies	February 2023	Academic year of realisation of subject			2023/2024		
Education level	second-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	1	Language of instruction			Polish		
Semester of study	2	ECTS credits			4.0		
Learning profile	general academic profile	Assessment form			assessment		
Conducting unit	Department of Metal Structures -> Faculty of Civil and Environmental Engineering						
Name and surname of lecturer (lecturers)	Subject supervisor		dr inż. Dariusz Kowalski				
	Teachers		dr inż. Dariusz Kowalski				
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	30.0	0.0	30.0	0.0	0.0	60
	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	60		5.0		35.0	100
Subject objectives	The aim of the course is to acquaint students with the methods of inspection and evaluation of metal structures under applicable acceptance standards. In class, students learn methods and techniques to identify flaws and inconsistencies in the welded joints. Methods for evaluating the correctness of the screw connections. Students will be familiarized with the rules for the implementation of technical descriptions and specifications for the construction of metal						
Learning outcomes	Course outcome	Subject outcome			Method of verification		
	[K7_W15] has deep and adequate knowledge of civil engineering, within offered specialization and profile	Student acquainted with the commonly used methods of nondestructive testing of metallic structures,			[SW1] Assessment of factual knowledge		
	[K7_K02] Recognizes the significance of knowledge in solving cognitive and practical problems; reliably evaluates results of his own and team research	The student knows the conditions to be met by a steel structure in the field of design, manufacturing, acceptance and operation			[SK5] Assessment of ability to solve problems that arise in practice		
	[K7_U06] is able to choose proper tools (measuring, analytical or numerical) to solve engineering problems, to acquire, filtrate, proces and analyse data	The student knows how to use measuring and research tools, knows their applications, working methods, limitations that affect the test result and assessment			[SU4] Assessment of ability to use methods and tools		
	[K7_U16] is able to estimate the technical condition of engineering object; can interpret the results of constructions and materials examination;	The student is acquainted with the criteria for assessing the condition of welded joints in welded steel constructions			[SU4] Assessment of ability to use methods and tools [SU5] Assessment of ability to present the results of task		
	[K7_U11] is able to plan and execute laboratory experiments to evaluate quality of construction materials and to determine strength of construction elements	The student knows how to choose tools and methods for the needs of the control			[SU3] Assessment of ability to use knowledge gained from the subject		

Subject contents	<p>Program content lecture classes:</p> <p>Organizational meeting, getting to know the content object, the terms of credit. Quality requirements, assembly, research NDT, etc. included in the building project. The welding process as a source of . Classification of non-compliance of welded joints of metal structures. Acquainted with the testing methods: VT - Visual Testing of welded joints; PT - Penetrant testing of welds; MT - Magnetic studies of welded joints; RT - Radiographic examination of welded joints; UT - Ultrasonic testing of welded joints; UT - Ultrasonic testing of welded joints. Other techniques for testing and inspection of metal structures. Legal requirements relating to the technical description of the project and the technical specifications. Technical Description and technical specifications for the design of steel structure, the necessary studies. Regulations and standards for the reception of metal. Condition technical performance and acceptance of metal structures. Quality assurance systems in the construction of metal structures. Plans Audit and Research for the objects implemented in the technology of metal structures. Examination lecture / lab - final test.</p> <p>Program content of the laboratory:</p> <p>Introduction - the purpose of teaching the subject. Terms pass the course. The organization of the laboratory. The division into groups laboratory. Metrology - measurements of geometric features elements using various gauges. Visual Testing VT - Determination of dimensions of welded joints ( Fillet Gauge , protractor ). Visual Testing VT - Discrepancies welded joints. PT penetrant testing, magnetic studies MT. X-rays RT - slideshow welded joints. Ultrasonic testing UT - thickness measurements using gages. Ultrasonic testing UT - use flaw - patterns. Ultrasonic flaw detector UT- use - artificial defects, discrepancies in real samples of welded joints. Research anticorrosion coatings. Technical description of the design of metal structures. Technical specifications for the design of metal structures. Technical specifications for the design of metal structures. Overview prepared by the students of the technical specifications. Final test.</p>								
Prerequisites and co-requisites	<p>Passed first degree course at the Faculty of Civil Engineering  Knowledge of the design and production of construction of metal structures  Knowledge of the techniques and welding processes used in building engineering</p>								
Assessment methods and criteria	<table border="1"> <thead> <tr> <th data-bbox="453 1146 794 1173">Subject passing criteria</th> <th data-bbox="799 1146 1141 1173">Passing threshold</th> <th data-bbox="1145 1146 1492 1173">Percentage of the final grade</th> </tr> </thead> <tbody> <tr> <td data-bbox="453 1180 794 1207">Test</td> <td data-bbox="799 1180 1141 1207">60.0%</td> <td data-bbox="1145 1180 1492 1207">100.0%</td> </tr> </tbody> </table>			Subject passing criteria	Passing threshold	Percentage of the final grade	Test	60.0%	100.0%
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Recommended reading	<p>Basic literature</p>	<ol style="list-style-type: none"> <li>Lewinska-Romicka A. Non-destructive testing. Basics defectoscopic. Scientific and Technical Publishing House, Warsaw 2001.</li> <li>Czuchryj J. Stachurski M.: Non-destructive welding testing. Welding Institute, Gliwice 2002</li> <li>PN EN 1090-1/2/3- Execution of steel structures and aluminum structures 1. Requirements for conformity assessment od structural components / 2. Technical requirements for steel structures / 3. Technical requirements for aluminium structures</li> <li>PN-B-06200: 2002 - Building steel structure. Constructional steelwork specification. Basic Requirements</li> <li>Hlebowicz J.: Visual testing. General principles and application examples. Gamma Office, Warsaw 1997</li> <li>Czuchryj J, Debski E.: Studies of welded joints according to European standards. Gamma Office, Warsaw 2000</li> </ol>							
	<p>Supplementary literature</p>	<ol style="list-style-type: none"> <li>PN EN 1993 - Design of steel structures (EC3 series of standards)</li> <li>PN-90/B-03200 - Steel structures. Design rules</li> <li>Jeziński G: Industrial Radiography. WNT Warsaw 1993</li> <li>Niedzielski A. Non Destructive Testing. Part I. Gdańsk, Ed. Gdansk University of Technology in 1991</li> <li>The current versions of the legislation on the descriptive part of the construction design and technical specifications.</li> <li>Current standards of conduct and grading structure based on non-destructive testing.</li> </ol>							
	<p>eResources addresses</p>	<p>Adresy na platformie eNauczanie:</p>							
Example issues/ example questions/ tasks being completed	<p>Non-destructive testing of metal constructions  Quality and safety requirements of metal structures  What are the physical phenomena are used in NDT testing methods?  As tests are carried out various research methods?  What are the tests used to assess the surface of welded joints?  What are the tests used to assess the volume of welded joints?  Research and evaluation of welds selected non-destructive methods, interpretation of results;  interpretation of project requirements;  determining regulatory requirements based on standards;  preparation of technical specifications metal structure based on performance standards and acceptance.</p>								
Work placement	<p>Not applicable</p>								