GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Overvoltage Protection of Low Voltage Equipment, PG_00046062		
Field of study	Electrical Engineering		
Date of commencement of studies	October 2020	Academic year of realisation of subject	2022/2023
Education level	first-cycle studies	Subject group	
Mode of study	Part-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	assessment
Conducting unit	Katedra Elektrotechniki i Inżynierii Wysokich Napięć -> Faculty of Electrical and Control Engineering		
Name and surname of lecturer (lecturers)	Subject supervisor	dr inż. Leszek Litzbarski	
	Teachers	dr inż. Leszek Litzbarski dr inż. Piotr Leśniak dr inż. Daniel Kowalak dr hab. inż. Marek Olesz	

Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	10.0	0.0	10.0	10.0	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	5.0	40.0	75

Subject objectives	Student understands the principles of protection against lightnings of building objects as well as the power system and he has the ability to design basic lightning and overvoltage protection systems.

Learning outcomes

Course outcome	Subject outcome	Method of verification
K6_W09	The student is able to calculate the lightning current distribution also taking into account wave phenomena	[SW3] Assessment of knowledge contained in written work and projects
K6_W10	A student is able to propose basic lightning protection systems for cubature objects, power installations, and electrical installations	[SW3] Assessment of knowledge contained in written work and projects
K6_W11	The student knows the rules of acceptance and evaluation of lightning and surge protection systems	[SW1] Assessment of factual knowledge
K6_K01	The student is able to search informations about surge protecion devices	[SK5] Assessment of ability to solve problems that arise in practice
K6_U10	The student is able to select the elements of lightning protection and surge protection in compliance with the requirements included in the standards	[SU1] Assessment of task fulfilment
K6_U09	The student is able to correctly select the location of SPD, the cross-sections of cables and provide additional protection for surge arresters	[SU4] Assessment of ability to use methods and tools
K6_U05	The student understands the mechanisms of the atmospheric discharge strokes on the electric power supply systems and electrical installations of buildings	[SU3] Assessment of ability to use knowledge gained from the subject

Subject contents

The external and internal surges in power installations. Parameters of lightning and lightning surges. Principles of lightning protection systems of buildings. Principles of lightning protection of technical infrastructure installed on buildings and in their vicinity. Elements and systems of protection against overvoltages in electrical installations, including IT networks.
Metal-oxide surge arresters - working principle, construction, application, selection and testing. Rules of the insulation coordination.

Prerequisites and co-requisites

no requirements

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
	60.0%	25.0%
	60.0%	25.0%
	60.0%	50.0%

Recommended reading

Basic literature	1. Hasse P., OCHRONA APARATURY ELEKTRONICZNEJ PRZED WYŁADOWANIAMI ATMOSFERYCZNYMI, COSIW 2004 2. Szpor S., Samuła J.: Ochrona odgromowa. WNT, Warszawa 1983 3. Markowska R., Sowa A.: Ochrona odgromowa obiektów budowlanych, Dom Wydawniczy MEDIUM, Warszawa 2009
Supplementary literature	1. Standard PN-EN 05115 Instalacje elektroenergetyczne wysokiego napięcia. 2. Standard PN-EN 62305 Ochrona odgromowa.
eResources addresses	Adresy na platformie eNauczanie:

Example issues/ example questions/ tasks being completed	1. The basic types of overvoltages in power systems. 2. Internal overvoltages, sources, typical values and voltage waveforms. 3. Development of lightning discharge, characteristic parameters of lightning discharge, registration methods. 4. Overvoltages in the power system caused by lightning strikes, their mechanism. 5. Propagation of surge waves in power lines, waveforms in lines, influence of wave impedance. 6. Waveforms in machine windings at various zero point connections. 7. Principles of mapping overvoltage exposures in voltage tests of equipment insulation, main principles of insulation coordination. 8. The principles and means of lightning protection used in electrical power systems. 9. Rules for lightning protection of buildings, external and internal protection. 10. Outdoor lightning protection of building structures, LPS elements, protective zone, protective angle 11. Impulse strength of electrical and electronic equipment. 12. Principles and means of internal lightning protection of building objects, concept of zone lightning protection. 13. Ectipotentialisation - the concept, principles and role in building lightning protection. 14. Checking the condition of surge protection devices, the principle of existing protection, types, scope and purpose of tests 15. Coordination principles of low voltage surge protective devices. 16. Construction and operation principle of various surge arresters: blowout and varistor spark gap and non-spark gap arresters. 17. Diagnostics of various types of surge protective devices. 18. Selection, assembly and protection of surge protective devices.
Work placement	Not applicable