



## Subject card

Subject name and code	Lightning Protection of Electrical Power Equipment, PG_00007791						
Field of study	Electrical Engineering						
Date of commencement of studies	October 2022		Academic year of realisation of subject		2024/2025		
Education level	first-cycle studies		Subject group				
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		4.0		
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 hab. inż. Marek Olesz				
	Teachers						
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	30.0	15.0	0.0	15.0	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 ability to design lightning and surge protection systems in buildings, including power infrastructure						
Learning outcomes	Course outcome		Subject outcome		Method of verification		
	K6_U09		The student is able to properly select the locations of surge arresters, cross-sections of wires and to secure surge arrester systems		[SU1] Assessment of task fulfilment		
	K6_K01		The student understands the mechanisms of the atmospheric discharge strokes on the electric power supply systems and electrical installations of buildings		[SK5] Assessment of ability to solve problems that arise in practice		
	K6_W10		The student is able to properly select the locations of surge arresters, cross-sections of wires and to secure surge arrester systems		[SW3] Assessment of knowledge contained in written work and projects		
	K6_K05		Student is able to propose basic lightning protection systems for cubature objects, power installations and electrical installations.		[SK5] Assessment of ability to solve problems that arise in practice		
Subject contents	The external and internal surges in high voltage circuits. Parameters of lightning and lightning surges. Principles of lightning protection systems of buildings. Rules for lightning protection of power stations and transmission lines. Units and surge protection systems in networks and high-voltage stations. Metal-oxide surge arresters - working principle, construction, application, selection and testing. Rules of the insulation coordination.						
Prerequisites and co-requisites	Knowledge of High Voltage Engineering and Electrical Engineering.						
Assessment methods and criteria	Subject passing criteria		Passing threshold		Percentage of the final grade		
	Written exam		60.0%		60.0%		
	Laboratory activities		60.0%		40.0%		

Recommended reading	Basic literature	<p>1. Markowska R., Sowa A.: Ochrona odgromowa obiektów budowlanych, Dom Wydawniczy MEDIUM, Warszawa 2009</p> <p>2. Szpor S.: Ochrona odgromowa. T. 1, 2. WNT, Warszawa 1973, 1975</p> <p>3. Szpor S., Samuła J.: Ochrona odgromowa. WNT, Warszawa 1983</p>
	Supplementary literature	<p>1. Standard PN-EN 05115 Instalacje elektroenergetyczne wysokiego napięcia.</p> <p>2. Standard PN-EN 62305 Ochrona odgromowa.</p>
	eResources addresses	Adresy na platformie eNauczanie:
Example issues/ example questions/ tasks being completed	<p>1. Development of lightning discharge, characteristic parameters of lightning discharge, registration methods.</p> <p>2. Overvoltages in the power system caused by lightning strikes, their mechanism.</p> <p>3. Propagation of surge waves in power lines, waveforms in lines, influence of wave impedance.</p> <p>4. Principles of mapping overvoltage exposures in voltage tests of equipment insulation, main principles of insulation coordination.</p> <p>5. The principles and means of lightning protection used in electrical power systems.</p> <p>6. Rules for lightning protection of buildings, external and internal protection.</p> <p>7. Outdoor lightning protection of building structures, LPS elements, protective zone, protective angle</p> <p>8. Earthing in lightning protection, types, measurement methods, static and impulse properties.</p> <p>9. Measurements of earthing of HV line towers with lightning conductors.</p> <p>10. Impulse strength of electrical and electronic equipment.</p> <p>11. Principles and means of internal lightning protection of building objects, concept of zone lightning protection.</p> <p>12. Equipotentialisation - the concept, principles and role in building lightning protection.</p> <p>13. Checking the condition of surge protection devices, the principle of existing protection, types, scope and purpose of tests</p> <p>14. Coordination principles of low voltage surge protective devices.</p> <p>15. Construction and operation principle of various surge arresters: blowout and varistor spark gap and non-spark gap arresters.</p> <p>16. Diagnostics of various types of surge protective devices.</p> <p>17. Selection, assembly and protection of surge protective devices.</p>	
Work placement	Not applicable	

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