

## SDAŃSK UNIVERSITY 的 OF TECHNOLOGY

## Subject card

Subject name and code	Team Project, PG_00038467							
Field of study	Electrical Engineering							
Date of commencement of studies	February 2024		Academic year of realisation of subject		2024/2025			
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 Electrical Engineering of Transport -> Faculty of Electrical and Control Engineering							
Name and surname of lecturer (lecturers)	Subject supervisor		dr hab. inż. Dariusz Karkosiński					
	Teachers		dr hab. inż. Dariusz Karkosiński					
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Projec	t	Seminar	SUM
	Number of study hours	15.0	15.0	0.0	15.0		0.0	45
	E-learning hours included: 0.0							
Learning activity and number of study hours	Learning activity	Participation in classes include plan	didactic Participation in consultation hours		n Iours	Self-study		SUM
	Number of study hours	45		11.0		44.0		100
Subject objectives	Strengthening the design skills on the power MV and LV switchgear network, and supply and control systems of industrial drives							

Learning outcomes	Course outcome	Subject outcome	Method of verification			
	K7_U09	Student discusses in detail the configuration and parameters of power generating units, substations, transmission and distribution networks. Using CAE programs, the student designs power, control and protection elements for medium voltage and medium voltage industrial electric drives	[SU1] Assessment of task fulfilment			
	K7_U13	Can choose the right software and use the software (CAD / CAE) supporting the work of a design engineer. He can select, configure and parameterize protection relays of various manufacturers	[SU4] Assessment of ability to use methods and tools			
	к7_к03	Student discusses in detail the configuration and parameters of power generating units, substations, transmission and distribution networks. Using CAE programs, the student designs power, control and protection elements for medium voltage and medium voltage industrial electric drives	[SK1] Assessment of group work skills			
	K7_W11	Characterizes the selection of medium voltage switchgear bays and their equipment.	[SW3] Assessment of knowledge contained in written work and projects			
	K7_K05	Explains the construction of devices and main circuits of power stations. Calculates the flow of currents and power as well as voltage losses and drops. Explains the functions of power protection automatics and classifies security according to the American ANSI standards applied in the EU. He explains the basics of creating systems and communication networks of power substations according to the PN- EN (IEC) 61850 standard. He specifies and uses the firmware to parameterize the protections in the medium voltage network.	[SK5] Assessment of ability to solve problems that arise in practice			
Subject contents	LECTURE and EXERCICES: Power supply systems for industrial facilities. Devices and main circuits of MV power stations. Short-circuit calculation. Power protection automation. Security classification according to American ANSI standards used in the EU. Microprocessor protection relays. Drive systems for medium power and medium voltage pumps. Roving inverters. PROJECT: Design of a MV switching station for a medium-power pumping station with smooth flow control and programming of security parameters.					
Prerequisites and co-requisites	Power Electrical engineering, electrical instalation design.					
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade			
	Practical exercise	50.0%	20.0%			
	Midterm colloquium	50.0%	40.0%			
	Project	50.0%	40.0%			
Recommended reading	Basic literature	<ol> <li>S. Niestępski i in., Instalacje elektryczne - budowa, projektowanie i eksploatacja, Warszawa 2001.</li> <li>Strojny J., Strzalka J.: Projektowanie urządzeń elektroenergetycznych. Uczelniane Wydawnictwo Naukowo- Dydaktyczne AGH, Kraków 2008.</li> <li>Winkler W., Wiszniewski A.: Automatyka zabezpieczeniowa w systemach elektroenergetycznych. WNT, Warszawa 2004.</li> <li>Praca zb. pod redakcja Kujszczyka S.: Elektroenergetyczne sieci rozdzielcze, Tom 1. I 2. Oficyna Wydawnicza Politechniki Warszawskiej, Warszawa 2004.</li> </ol>				

	Supplementary literature	<ol> <li>Kowalik R., Januszewski M., Smolarczyk A.:Cyfrowa elektroenergetyczna automatyka zabezpieczeniowa. Oficyna Wydawn. Politechniki Warszawskiej, Warszawa 2006.</li> <li>PN-EN 61850 Systemy i sieci komunikacyjne w stacjach elektroenergetycznych.</li> <li>Lakervi E., Holmes E.J.: Electricity Distribution Network Design. 2nd Edition. London 2007.</li> <li>Z. Nartowski, Normalizacja w elektryce, INPE 2004, No 58, pp. 15-25.</li> </ol>		
	eResources addresses	Adresy na platformie eNauczanie:		
Example issues/ example questions/ tasks being completed	4.         Z. Nartowski, Normalizacja w elektryce, INPE 2004, No 58, pp 15-25.           eResources addresses         Adresy na platformie eNauczanie:           1. How to apply withdrawable circuit breakers?         What is the basic advantage of the use of high-speed earthing switch in the MV substations?           3. Which system of rapid shutdown arc in the MV is better and why - based on the opening of the safety valves at the top of the switchgear or optoelectronic system?           4. In witch the range of arc-safety MV substation occurs mostly to the arc and why?           5. Describe the successive elements of the feeder bay of 110 kV overhead line, starting from the busba 6. Which are the most common technologies for MV substations?           8. What are the tasks of preventive automation at MV substations?           9. What are the tasks of preventive automation at MV substations?           9. What are the features to meet the protection system for the MV cable line to the medium power motor pump drive? Give code ANSI / IEEE Std C37.2.           10. What are the features to meet the protection system for the MV cable line to the medium power motor and arive? Give code ANSI / IEEE Std C37.2.           11. Replace the methods used for grounding the neutral MV distribution networks.           13. Replace the methods used for grounding the neutral MV distribution networks.           14. Nuhat are the disadvantages of the MV network with isolated neutral?           15. Uhat are the disadvantages of the MV network with isolated neutral?           15. What are the function of the ANSI 50BF. </td			
Work placement	Not applicable			