GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Industrial Supply and Control Systems, PG_00046059		
Field of study	Automation, Robotics and Control Systems		
Date of commencement of studies	October 2021	Academic year of realisation of subject	2023/2024
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	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		

Lesson types and methods of instruction

Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
Number of study hours	30.0	0.0	0.0	15.0	0.0	45

E-learning hours included: 0.0

Learning activity and number of study hours

Learning activity	Participation in didactic classes included in study plan	Participation in consultation hours	Self-study	SUM
Number of study hours	45	10.0	45.0	100

Subject objectives

Getting to know devices, installations and power systems as well as control systems in industrial and public facilities. Learning principles of designing electrical systems for power supplying and controlling industrial drives using CAE programs.

Learning outcomes

Course outcome	Subject outcome	Method of verification
[K6_W06] knows the structure of computers and microprocessors and the tasks of operating systems, has basic knowledge of the basics of computer software, drivers, microprocessor technology, design of simple algorithms and the operation of information networks	The student presents the advantages and disadvantages of individual structures of microprocessor systems, their programming and data transmission through communication networks	[SW3] Assessment of knowledge contained in written work and projects
[K6_W07] has basic knowledge related to control and automation systems	The student describes modern solutions of control and automation systems and the principles of their operation	[SW3] Assessment of knowledge contained in written work and projects
[K6_W11] knows the hazards arising from devices, installations, systems and technical systems, basic principles of occupational health and safety, taking into account the role of control and security systems in controlling automation and robotics facilities	The student knows the applicable regulations to ensure safety and defines the control and security systems of facilities. The student distinguishes the requirements of the Machinery Directive, including the categories of emergency stop, redundancy and diversification in engine power control systems.	[SW1] Assessment of factual knowledge
[K6_U04] has the ability to self-educate, among other things, in order to improve professional qualifications	He prrovides the basics for acquiring current knowledge and regulations in the field of industrial electrical engineering. Knows how to prepare for exams for qualifications to perform independent functions in construction.	[SU2] Assessment of ability to analyse information
[K6_K05] can think and act in an entrepreneurial way	After receiving a practical engineering task, the student begins to organize a team of contractors, assigns them roles and develops a schedule and accounts for the progress of work.	[SK5] Assessment of ability to solve problems that arise in practice

Subject contents	LECTURE: Graphical symbols, letter-digit designations of electrical devices and devices used in power supply systems. Electricity distribution systems for powering large industrial facilities. Selection and operation of devices and apparatus. Designing cable lines and busducts. Construction and operation of power connectors. Overcurrent and overvoltage protection systems. Backup sources of power supply. Automatic power supply switching devices (ATSE) with the function of automatic switching on the power reserve (AS) and automatic return transfer (ARS). Fundamentals of power protection automation. Coordination of selection of motor connection kits. Implementation of the requirements of the Machinery Directive, including the category of emergency stop, redundancy and diversification in power supply control systems for motors and industrial facilities. PROJECT: Intensive course of creating diagrams and design documentation of power supply systems using the EPLAN Electric P8 design aid program. Parameterization of selective power protections - work supported by software tools of well-known equipment manufacturers. Preparation of the installation design for 3 electric industrial drives, in particular: power supply installation containing internal equipment of switchgears (including circuit breakers, disconnectors, fuses), cables, wires and fire protection switch; manual control and emergency stop installations and systems; signaling elements.
Prerequisites and co-requisites	Fundamentals of theoretical electrical engineering and technical physics

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
design	50.0%	50.0%
2 tests after 45 minutes	51.0%	50.0%

Recommended reading

Basic literature	1. Wiatr J.: Poradnik projektanta elektryka tom 1 i 2. Wyd. Medium 2021 2. S. Niestępski i in., Instalacje elektryczne - budowa, projektowanie i eksploatacja, Warszawa 2001. 3. Strojny J., Strzalka J.: Projektowanie urządzeń elektroenergetycznych. Uczelniane Wydawnictwo Naukowo-Dydaktyczne AGH, Krakow 2008. 4. Markiewicz H.: Urządzenia elektroenergetyczne. WNT, Warszawa 2008. 5. Gruss S.: Poradnik elektryka i automatyka, Merlin Gerin 1996 6. Markiewicz H.: Urządzenia elektroenergetyczne. WNT, Warszawa 2001
Supplementary literature	1. Markiewicz H.: Instalacje elektryczne. WNT, Warszawa 2007. 2. Musiał E.: Instalacje i urządzenia elektroenergetyczne. WSiP, Warszawa 2008. 3. Markiewicz H.: Instalacje elektryczne. WNT, Warszawa 2007. 4. D. Karkosiński, Nowe trendy w budowie automatycznych urządzeń przełączających SZR/SPP niskiego napięcia. Gdańskie Dni Elektryki SEP 2008. 5. Lakervi E., Holmes E.J.: Electricity Distribution Network Design. 2nd Edition. London 2007. 6. PN-EN 60204-1:2010 : Bezpieczeństwo maszyn -- Wyposażenie elektryczne maszyn -- Część 1: Wymagania ogólne

	eResources addresses	Podstawowe https://pbc.gda.pl/dlibra/publication/14114/edition/12259 - The electrician and automation guide contains the basics, especially in terms of design Uzupełniające Adresy na platformie eNauczanie:
Example issues/ example questions/ tasks being completed	1. What phenomenon / parameter limits the maximum length of contactor control circuits? Give two ways to eliminate the impact of this phenomenon? 2. The category of use of switchgears that are not used for frequent starting and reversing of an induction motor is marked with the symbol: a) AC3 b) DC4 c) AC4 d) AC 3. Explain the designation: gG 32 A, aF 630 A, D32A 15kA 4. What are the two basic differences visible from the outside between the tariff circuit breaker and the motor switch and the three-pole circuit breaker? 5. The compact circuit breaker was turned off as a result of its overload release. What steps should you take to re-enable it? 6. The YAKy 4x 50 mm2 cable laid in the ground should be extended with a YKy cable. What can be the smallest cross section of this cable's core? How to connect the wires of both cables? 7. What phenomenon in large asynchronous motors can cause a significant current when switching to a standby power source in ATS mode? 8. Draw a connection diagram for two three-wire NPN 24V DC (NO) induction sensors and one four-wire PNP 24V DC (NO / NC) induction sensor to the coil of one auxiliary relay. Mark the standard wire colors. 9. In the presented system T1, T2 and T3 cannot work in parallel. Draw the full manual control diagram (using the buttons) with active and passive electric lock.	
Work placement	Not applicable	