



## Subject card

Subject name and code	, PG_00058641						
Field of study	Power Engineering, Power Engineering, Power Engineering						
Date of commencement of studies	February 2023	Academic year of realisation of subject	2023/2024				
Education level	second-cycle studies	Subject group					
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	3.0				
Learning profile	general academic profile	Assessment form	assessment				
Conducting unit	Department of Controlled Electric Drives -> Faculty of Electrical and Control Engineering						
Name and surname of lecturer (lecturers)	Subject supervisor	dr hab. inż. Leszek Jarzębowski					
	Teachers						
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	15.0	15.0	0.0	0.0	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	0.0	0.0	30		
Subject objectives	Getting to know different technical conditions for applying electronic devices in industry.						

Learning outcomes	Course outcome	Subject outcome	Method of verification
	[K7_U04] is able to plan and perform experiments using measurements and computer simulations, together with interpretation of results, is able to present and evaluate the course and results of work in a team realizing an advanced engineering project, is able to use technical documentation and to create it independently	Student resolves basic project tasks.	[SU1] Assessment of task fulfilment
	[K7_U03] has the necessary preparation to work in an industrial environment, is prepared to undertake third degree studies, applies the principles of safety and hygiene	Student uses the equipment of lecture and exercise rooms according to safety instructions.	[SU4] Assessment of ability to use methods and tools
	[K7_U05] is able to integrate technical and economic analysis of the use of various energy technologies, including technologies using renewable energy sources and conventional and nuclear energy	Student knows the typical level of rated power of solar panels with respect to their surface.	[SU1] Assessment of task fulfilment
	[K7_K71] is able to explain the need to apply knowledge from humanistic, social, economic or legal sciences in order to function in a social environment	Student describes the impact of industrial electronics on human's life standard.	[SK2] Assessment of progress of work
	[K7_U71] is able to apply knowledge from humanistic, social, economic or legal sciences in order to solve problems	Student describes the impact of industrial electronics on human's life standard.	[SU3] Assessment of ability to use knowledge gained from the subject
[K7_W06] knows the extended issues of reliability of power equipment and diagnostics of defects in this equipment	Students knows fiber-optic technique used in electric power distribution.	[SW3] Assessment of knowledge contained in written work and projects	
Subject contents	Electronic devices and components: sensors, transducers, mixed signal processors, computer interfaces. Intelligent power modules IPM: integrated protection functions, sensors, drive circuits. Optoelectronics and power electronics devices. Transducers with specialized interfaces for measurement: current, voltage, velocity and displacement). Industrial electronics application. Applications of microprocessors and microcontrollers. Motion control and positioning. Brushless dc and ac servo motors. Basics of computer numerical control. Control algorithms - torque control, speed and location, stiffness of the drive. Programmable motion control. Contactless energy transfer.		
Prerequisites and co-requisites			
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Tests during exercises	60.0%	30.0%
	Test during lecture	60.0%	70.0%
Recommended reading	Basic literature	Mohan N.: Power Electronics. A First Course. John Wiley & Sons, Inc. 2012.  Younkin G. W.: Industrial Servo Control Systems. Fundamentals and Application. Marcel Dekker 2003.  Grzesiak L.M.: Sterowanie napędów i serwonapędów elektrycznych. Preskrypt. Politechnika Warszawska 2009.  Web pages manufacturers of components and devices of industrial electronics.	
	Supplementary literature	Wilamowski B. M., Irwin J. D.: The Industrial Electronics Handbook. Power electronics and motor drives. CRC Press, Taylor and Francis Group, LLC, 2011.  Tobin S. M.: DC Servos. Application and Design with MATLAB. Press, Taylor and Francis Group, LLC, 2011.	
	eResources addresses	Adresy na platformie eNauczenie:	

Example issues/ example questions/ tasks being completed	Draw recommended and not recommended for the control optocoupler power electronic devices and explain the impact of electromagnetic disturbances on these systems.  Define the servo drive and draw a simplified block diagram. In the figure distinguish signals feedback. Explain the action of the individual blocks.
Work placement	Not applicable