GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Power Engineering Electronics, PG_00038095		
Field of study	Automation, Robotics and Control Systems		
Date of commencement of studies	October 2026	Academic year of realisation of subject	2027/2028
Education level	first-cycle studies	Subject group	
Mode of study	Full-time studies	Mode of delivery	at the university
Year of study	2	Language of instruction	Polish
Semester of study	4	ECTS credits	3.0
Learning profile	general academic profile	Assessment form	exam
Conducting unit	Department of Electrified Transportation -> Faculty of Electrical and Control Engineering -> Faculties of Gdańsk University of Technology		
Name and surname of lecturer (lecturers)	Subject supervisor	dr hab. inż. Leszek Jarzębowicz	
	Teachers		

Lesson types

Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
Number of study hours	15.0	0.0	15.0	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	6.0	39.0	75

Subject objectives

Gaining knowledge about power electronic devices and power converters.

Learning outcomes

Course outcome	Subject outcome	Method of verification
[K6_W05] has basic knowledge of the principles of operation of basic electronic, energy and power electronic components and systems		
[K6_W04] has basic knowledge of methods of analysis of direct and alternating current circuits		
[K6_K05] can think and act in an entrepreneurial way		
[K6_U04] has the ability to self-educate, among other things, in order to improve professional qualifications		

Subject contents

Course content – lecture
Fundamental mathematical relations. Introduction to power electronics. Printed circuit boards. Measurement equipment. Passive elements. Diodes. Uncontrolled rectifiers. SCR thyristors. Controlled rectifiers. GTO thyristors. BJT, IGBT and MOSFET transistors. DC/DC converters. DC/AC converters (voltage inverters). Gate drivers. SiC and GaN transistors. Cooling of power devices. Electromagnetic disturbances in power converters. Servo drives. "Intelligent" IPM and ASIPM power modules. Microprocessor control of power converters.

Prerequisites and co-requisites

Basic knowledge on electrical engineering and electronics.

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
Written exam	60.0%	70.0%
Reports and tests from laboratory exercises	60.0%	30.0%

Recommended reading	Basic literature	[1] Barlik R., Nowak M.: Energoelektronika. Elementy, podzespoły, układy. Oficyna Wyd. PW, 2014. [2] Januszewski S., Świątek H., Zymmer K.: Przyrządy półprzewodnikowe mocy. Właściwości i zastosowania. WKiŁ, Warszawa, 1999. [3] Nowak M., Barlik R.: Poradnik inżyniera energoelektronika. WNT, Warszawa, 1998. [4] Szczęsny R.: Komputerowa symulacja układów energoelektronicznych. Wyd. Politechniki Gdańskiej, Gdańsk, 1999. [5] Kaźmierkowski M. P., Matysik T. J.: Wprowadzenie do elektroniki i energoelektroniki. Oficyna Wyd. PW, 2005.
	Supplementary literature	[6] Mohan N.: Power electronics: a first course. John Wiley & Sons Inc. 2012. [7] Januszewski S., Pytlak A., Rosnowska-Nowaczyk M., Świątek H.: Energoelektronika. WSiP, Warszawa 2012.
	eResources addresses	
Example issues/ example questions/ tasks being completed	1. AC/DC converters - types, operation controlled rectifier. 2. DC/AC inverters - voltage inverter topologies, PWM control. 3. Properities of various power devices.	
Practical activites within the subject	Not applicable	

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