



## Subject card

Subject name and code	Introduction to Power Electronics, PG_00042048						
Field of study	Power Engineering, Power Engineering, Power Engineering, Power Engineering, Power Engineering						
Date of commencement of studies	October 2020	Academic year of realisation of subject			2021/2022		
Education level	first-cycle studies	Subject group			Obligatory subject group in the field of study 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	2	Language of instruction			Polish		
Semester of study	4	ECTS credits			3.0		
Learning profile	general academic profile	Assessment form			assessment		
Conducting unit	Department of Power Electronics and Electrical Machines -> Faculty of Electrical and Control Engineering						
Name and surname of lecturer (lecturers)	Subject supervisor	dr hab. inż. Piotr Musznicki					
	Teachers	dr hab. inż. Piotr Musznicki dr inż. Krzysztof Iwan					
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	30.0	0.0	15.0	0.0	0.0	45
	E-learning hours included: 0.0						
	Adresy na platformie eNauczenie: Podstawy Energoelektroniki [2021/22] - Moodle ID: 22944 <a href="https://enauczenie.pg.edu.pl/moodle/course/view.php?id=22944">https://enauczenie.pg.edu.pl/moodle/course/view.php?id=22944</a>						
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	5.0	25.0	75		
Subject objectives	The aim of the course is to familiarize students with the basic of power electronics converters including their construction, methods of control, application and problems of their. Classical topologies are presented and newest selected issues, especially for the control of electrical machines and for renewable energy sources.						
Learning outcomes	Course outcome	Subject outcome			Method of verification		
	K6_K02	Students working in groups are able to verify the laboratory exercise program, distribute tasks, and write documentation.			[SK1] Assessment of group work skills		
	K6_W03	Students are able to choose the power electronics inverter linked with electro-mechanical machine or system.			[SW1] Assessment of factual knowledge		
	K6_W05	Introduction to Power Electronics presents importance of modern Power Electronics converters in engineering practice. It acquaint students with basic Power Electronics elements and devises and problems which can appears during exploitation. Students learn the most often used devices topology, their application and control method and understand phenomena and processes connected with operation of power switches and converters.			[SW1] Assessment of factual knowledge		

Subject contents	Lecture: 1. The role of Power Electronics. Basic elements.2/3 Rectifiers 4/5 DC/DC low power converters 6/7 DC/AC Inverters 8. Basic and method of modulation used in PE. 9 AC/AC converters 10. Resonant converters 11 Control systems. 12/13 Energetic aspects in PE, fast switches, quality of conversion energy, ups and active filters 14/16 Selected problems in PE converters, electromagnetic compatibility, signal distortion , secure circuit. Laboratory: 1. 1-phase diode rectifier 2.Power transistors IGBT 3. Thyristors 4. 1-phase voltage inverter 5.AC/AC converter 6. Transformerless DC/DC converters		
Prerequisites and co-requisites	Basic knowledge of theoretical laws and analysis method in electrical circuit.		
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Laboratory	60.0%	50.0%
	Midterm colloquium	50.0%	30.0%
	Endterm colloquium	60.0%	20.0%
Recommended reading	Basic literature	<p>1.Nowak M., Barlik R.: Poradnik inżyniera energoelektronika. Warszawa: WNT 1998.</p> <p>2.Mohan N., Undeland T.M., Robbins W.P., Power Electronics: Converters, Applications and Design, 3rd Edition, John Willey &amp; Sons, Inc, 2003.</p> <p>3.Materiały pomocnicze do Laboratorium w postaci autorskich instrukcji udostępnianych przez Internet</p>	
	Supplementary literature	<p>1.Tunia H., Smirnow A., Nowak M., Barlik R.: Układy Energoelektroniczne. Warszawa: WNT 1998.</p> <p>2.Dmowski A: Energoelektroniczne układy zasilania prądem stałym w telekomunikacji i energetyce. Warszawa: WNT 1998.</p> <p>3.Każmierkowski M.P., Matysik J.T., Wprowadzenie do elektroniki i energoelektroniki, Oficyna Wydawnicza Politechniki Warszawskiej, Warszawa 2005.</p>	
	eResources addresses	Podstawy Energoelektroniki [2021/22] - Moodle ID: 22944 <a href="https://enauczenie.pg.edu.pl/moodle/course/view.php?id=22944">https://enauczenie.pg.edu.pl/moodle/course/view.php?id=22944</a>	
Example issues/ example questions/ tasks being completed			
Work placement	Not applicable		