



## Subject card

Subject name and code	Power Converters, PG_00053923						
Field of study	Electronics and Telecommunications						
Date of commencement of studies	October 2020		Academic year of realisation of subject		2022/2023		
Education level	first-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	3		Language of instruction		Polish		
Semester of study	6		ECTS credits		2.0		
Learning profile	general academic profile		Assessment form		assessment		
Conducting unit	Department of Microelectronic Systems -> Faculty of Electronics, Telecommunications and Informatics						
Name and surname of lecturer (lecturers)	Subject supervisor		dr hab. inż. Grzegorz Blakiewicz				
	Teachers		dr hab. inż. Grzegorz Blakiewicz				
Lesson types and methods of instruction	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		3.0		17.0	50
Subject objectives	Provide knowledge of the design and analysis of basic configurations of power converters. Practical learning of the principle of operation of converters and verification of parameters using computer simulators and laboratory measurements.						
Learning outcomes	Course outcome		Subject outcome		Method of verification		
	[K6_U03] can design, according to required specifications, and make a simple device, facility, system or carry out a process, specific to the field of study, using suitable methods, techniques, tools and materials, following engineering standards and norms, applying technologies specific to the field of study and experience gained in the professional engineering environment		Student is familiar with the methods of selection of components for different switching converter configurations. In the laboratory he verified the correctness of the choice of the elements and their parameters, performed simulations to verify the correctness of the operation of the converters.		[SU4] Assessment of ability to use methods and tools [SU1] Assessment of task fulfilment		
	[K6_W32] Knows the parameters, functions and methods of analysis, design and optimization of analogue and digital circuits and electronic systems		Student learnt theory and design of basic switching converters.He learned the way of selecting components for converters and measurement techniques.		[SW3] Assessment of knowledge contained in written work and projects [SW1] Assessment of factual knowledge		
Subject contents	<div>1. General characteristics of power converters</div> <div>2. Introduction to the analysis of pulse converters</div> <div>3. Principle of operation and analysis of buck converter</div> <div>4. Principle of operation and analysis of boost converter</div> <div>5. Principle of operation and analysis of buck-boost converter</div> <div>6. First colloquium</div> <div>7. Principle of operation and analysis of a flyback converter</div> <div>8. Principle of operation and analysis of forward converter</div> <div>9. Analysis of converter operation in discontinuous coil current mode</div> <div>10. Power losses in converters</div> <div>11. Control loop - output voltage stabilization</div> <div>12. Continuous time voltage regulators</div> <div>13. Improvement and protection circuits</div> <div>14. Final colloquium</div>						

Prerequisites and co-requisites	No requirements		
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Midterm colloquium	50.0%	80.0%
	Practical exercise	50.0%	20.0%
Recommended reading	Basic literature	Ö. Ferenczi, Zasilanie układów elektronicznych Zasilacze impulsowe A. Borkowski, Układy scalone w stabilizatorach napięcia stałego	
	Supplementary literature	K. Kit Sum, Switch-mode power conversion M. K. Kazimierczuk, Pulse-width Modulated DC-DC Power Converters	
	eResources addresses	Adresy na platformie eNauczanie:	
Example issues/ example questions/ tasks being completed			
Work placement	Not applicable		