



Subject card

Subject name and code	Power Converters, PG_00053923						
Field of study	Electronics and Telecommunications						
Date of commencement of studies	October 2024	Academic year of realisation of subject			2026/2027		
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 design and optimization of basic switching converter configurations. Practical learning of principles of operation of switching converters and verification of parameters using computer simulators.						
Learning outcomes	Course outcome	Subject outcome			Method of verification		
	[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.			[SW1] Assessment of factual knowledge [SW3] Assessment of knowledge contained in written work and projects		
	[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.			[SU1] Assessment of task fulfillment [SU4] Assessment of ability to use methods and tools		
Subject contents	1 General characteristics of power converters2 Introduction to the analysis of switching converters3. Principle of operation and analysis of buck converter4. Principle of operation and analysis of boost converter5. Principle of operation and analysis of buck-boost converter6. First colloquium7. Principle of operation and analysis of flyback converter8. Principle of operation and analysis of forward converter9. Analysis of converter operation in discontinuous current mode10. Power losses in converters11. Control loop - output voltage stabilization12. Linear voltage regulators13. Improvement and protection circuits14. Final colloquium						
Prerequisites and co-requisites	No requirements						
Assessment methods and criteria	Subject passing criteria	Passing threshold			Percentage of the final grade		
	Practical exercise	50.0%			20.0%		
	Midterm colloquium	50.0%			80.0%		

Recommended reading	Basic literature	Ó. 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	

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