GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Power Converters, PG_00053923		
Field of study	Electronics and Telecommunications		
Date of commencement of studies	October 2023	Academic year of realisation of subject	2025/2026
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.	[SW3] Assessment of knowledge contained in written work and projects [SW1] Assessment of factual knowledge
[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

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	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	

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