GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Power conversion in autonomous systems, E:41046W0		
Field of study	Space and Satellite Technologies		
Date of commencement of studies	February 2025	Academic year of realisation of subject	2024/2025
Education level	second-cycle studies	Subject group	
Mode of study	Full-time studies	Mode of delivery	at the university
Year of study	1	Language of instruction	English
Semester of study	1	ECTS credits	2.0
Learning profile		Assessment form	assessment
Conducting unit	Department Of Power Electronics And Electrical Machines -> Faculty Of Electrical And Control Engineering -> Wydziały Politechniki Gdańskiej		
Name and surname of lecturer (lecturers)	Subject supervisor	dr hab. inż. Piotr Musznicki	
	Teachers	dr hab. inż. Piotr Musznicki	

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	0.0	0.0	30

Subject objectives

To familiarise students theoretically and practically with issues of power conversion in autonomous systems.

Learning outcomes

Course outcome	Subject outcome	Method of verification
K7_U09	He is able to use in practice his knowledge on power converters in autonomous systems.	[SU1] Assessment of task fulfilment [SU4] Assessment of ability to use methods and tools
[K7_K02] Understands the non-technical aspects of activities in the field of space and satellite technologies, including their social consequences and impact on the state of the environment. Expresses opinions on the development of technology and related risks.	He understands non-technical aspects of issues related to power converters in autonomous systems.	[SK2] Assessment of progress of work
K7_W06	Student has the knowledge on how the newest power electronic converters in autonomous systems are built and how they operate, what are the requirements for selecting power systems for specific applications, especially for working with batteries and photovoltaic panels, and how the use of converters influences the quality of energy and the environment.	[SW1] Assessment of factual knowledge

Subject contents

Introduction of autonomous systems. Modern semiconductor devices (GaN, SiC), consolidation. DC / DC topologies (unidirectional - bidirectional). Operation and control of: resonant converter LLC, dual active bridge converter and three-phase + multi-level inverter. Control systems of power electronic systems. Battery charging / discharging systems; Introduction of simulation software. The simulation of coveter DC/ DC/AC. Sensitive study. Optimal components selection. Analysis of normal and fault operation.

Prerequisites and co-requisites

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<table>
<tr><td>Assessment methods and criteria</td><td colspan="2"><table><tr><th>Subject passing criteria</th><th>Passing threshold</th><th>Percentage of the final grade</th></tr><tr><td>test at the last lecture</td><td>50.0%</td><td>50.0%</td></tr><tr><td>grades from laboratory reports</td><td>50.0%</td><td>50.0%</td></tr></table></td></tr>
<tr><td rowspan="3">Recommended reading</td><td>Basic literature</td><td>Students will receive a reading list at the beginning of the semester.</td></tr>
<tr><td>Supplementary literature</td><td>-</td></tr>
<tr><td>eResources addresses</td><td>Adresy na platformie eNauczanie:
Power conversion in autonomous systems [ETI][2024/25] - Moodle ID: 45958
https://enauczanie.pg.edu.pl/moodle/course/view.php?id=45958</td></tr>
<tr><td>Example issues/ example questions/ tasks being completed</td><td colspan="2">-</td></tr>
<tr><td>Work placement</td><td colspan="2">Not applicable</td></tr>
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