GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Energoelectronics and Control of Electrical Drives, PG_00047624		
Field of study	Automatic Control, Cybernetics and Robotics		
Date of commencement of studies	October 2022	Academic year of realisation of subject	2024/2025
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	3.0
Learning profile	general academic profile	Assessment form	assessment
Conducting unit	Department of Automatic Control -> Faculty of Electronics, Telecommunications and Informatics		
Name and surname of lecturer (lecturers)	Subject supervisor	dr inż. Marcin Pazio	
	Teachers	dr inż. Marcin Pazio	

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

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	3.0	27.0	75

Subject objectives

Introduction to power electronic design (converters AC/DC, DC/DC, DC/AC) and drives control design.

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 can design measuring systems in power electronics and drive systems applications	[SU1] Assessment of task fulfilment
[K6_K02] is ready to critically assess possessed knowledge and acknowledge the importance of knowledge in solving cognitive and practical problems	The student can use industry literature in the field power electronics	[SK2] Assessment of progress of work

<table>
<tr><td>Subject contents</td><td>1. Electric drives classification
2. Electric drives characteristics
3. Direct current machines principles
4. Direct current machines construction
5. Commutation in direct current machines
6. Direct current generators
7. Direct current engines
8. One phase transformers
9. Three phase transformers
10. Transformer efficiency and power losses
11. Induction machine principles
12. Slip
13. Three phase induction engines
14. One phase induction engines
15. Induction engine start-up
16. Induction engine speed control
17. Synchronous machines
18. Power factor
19. Tachometer generator
20. Step motors
21. Step motor controllers
22. Micromachines
23. Electrical heating components
24. Inductive heating components
25. Wiring design
26. Protection design for electric drives
27. Contactor selection
28. Semiconductor power elements
29. Diodes
30. Thyristors
31. Triacs
32. Power transistors
33. Semiconductor relays
34. Power integrated circuits
35. Semiconductor overvoltage protection
36. Cooling power semiconductors
37. One phase rectifier
38. Three phase rectifier
39. Controlled rectifier
40. Constant voltage regulators
41. Voltage converters
42. Scalar frequency converters
43. Vector frequency converters
44. Electric heater power control
45. Electromagnetic interferences generated by power elements
46. Power engineering electronic circuits design and assembly rules
47. Safety principles
48. Power engineering electronic in power supply systems
49. Power engineering electronic in modern power sources</td></tr>
<tr><td>Prerequisites and co-requisites</td><td></td></tr>
<tr><td>Assessment methods and criteria</td><td>
<table>
<tr><th>Subject passing criteria</th><th>Passing threshold</th><th>Percentage of the final grade</th></tr>
<tr><td>Writen test - drives</td><td>55.0%</td><td>33.0%</td></tr>
<tr><td>Laboratory</td><td>55.0%</td><td>34.0%</td></tr>
<tr><td>Written test - power electronics</td><td>55.0%</td><td>33.0%</td></tr>
</table>
</td></tr>
<tr><td rowspan="3">Recommended reading</td><td>Basic literature</td><td>Stanisław Piróg, "Energoelektronika. Układy o komutacji sieciowej i o komutacji twardej", Kraków 2006
Zbigniew Stein, "Maszyny i napęd elektryczny", Warszawa 1989</td></tr>
<tr><td>Supplementary literature</td><td>No requirements</td></tr>
<tr><td>eResources addresses</td><td>Adresy na platformie eNauczanie:</td></tr>
<tr><td>Example issues/ example questions/ tasks being completed</td><td></td></tr>
<tr><td>Work placement</td><td>Not applicable</td></tr>
</table>