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 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	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

Subject contents	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
Prerequisites and co-requisites	
Assessment methods and criteria	

Subject passing criteria	Passing threshold	Percentage of the final grade
Writen test - drives	55.0%	33.0%
Laboratory	55.0%	34.0%
Written test - power electronics	55.0%	33.0%

Recommended reading	Basic literature	Stanisław Piróg, "Energoelektronika. Układy o komutacji sieciowej i o komutacji twardej", Kraków 2006 Zbigniew Stein, "Maszyny i napęd elektryczny", Warszawa 1989
	Supplementary literature	No requirements
	eResources addresses	Adresy na platformie eNauczanie:
Example issues/ example questions/ tasks being completed		
Work placement	Not applicable	