GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Electric Machines, PG_00038436		
Field of study	Hydrogen Technologies and Electromobility		
Date of commencement of studies	October 2025	Academic year of realisation of subject	2026/2027
Education level	first-cycle studies	Subject group	Obligatory subject group in the field of study 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	2	Language of instruction	Polish
Semester of study	3	ECTS credits	5.0
Learning profile	general academic profile	Assessment form	exam
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. Michał Michna	
	Teachers		

Lesson types and methods of instruction

Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
Number of study hours	30.0	0.0	30.0	0.0	0.0	60

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	60	8.0	57.0	125

Subject objectives

Get acquainted with constraction, theory and application of electric machines and transformers.

Getting to know the structures and elements of electric drive systems.

Verification of the theory in the laboratory

Learning outcomes

Course outcome	Subject outcome	Method of verification
[K6_W06] knows the construction and operation of transformers, electronic circuits, electrical machines, low and high temperature electrolysers, electrical drive systems, their modeling and industrial applications; knows the principles of the processing, use and rational use of electricity, including the principles of electric traction in various transport systems,knows the hazards from electrical equipment	Explains the general principles of construction and physical basis of operation of electrical machines. Explains the construction, principle of operation and modeling of electrical machines and transformers. Explains the parameters and characteristics of electrical machines and transformers. Explains the general principles of construction and operation of electrolyzers	[SW1] Assessment of factual knowledge [SW3] Assessment of knowledge contained in written work and projects
[K6_K01] is aware of the need for continuous education and self-improvement and knows the possibilities of further education	Identifies the need to update knowledge in the field of electrical machines and their applications. Uses current technical documentation and publications to solve engineering tasks	[SK5] Assessment of ability to solve problems that arise in practice
[K6_K02] can work in a group taking on different roles in it	Organizes teamwork. The student selects appropriate methods for solving a problem. Exchanges information with team members. Uses technical language. Estimates the time needed to complete a task. Performs work according to schedule.	[SK1] Assessment of group work skills [SK3] Assessment of ability to organize work [SK4] Assessment of communication skills, including language correctness
[K6_K04] can react in abnormal and emergency situations, threats to health and life when using automation and robotics components and systems in hydrogen devices and installations	Applies occupational health and safety rules. Explains the rules for responding to emergency situations.	[SK3] Assessment of ability to organize work [SK4] Assessment of communication skills, including language correctness

Subject contents

LECTURE: Types and ways of producing magnetic fields.. Generation of electromagnetic torque and induced voltages. Electrical machines and material technology. Classification of electrical machines. Design, principle of operation and properties of single and three-phase transformers. Design, principle of operation and properties of dc and ac machines.General principles of regulating the speed of electric motors. Control properties of rotating generators. **LABORATORY** Transformer properties. Characteristics of asynchronous motor fed from converter and power system. Characteristics of shunt direct current motor and generator. Characteristics of synchronous generator and parallel works at power system. Possibility of a virtual tour inside the nacelle of a wind turbine and manipulating components of real electric machines using VR goggles and the application available on the eNauczanie platform.

Prerequisites and co-requisites

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
Writing, practical and oral exam	50.0%	60.0%
Practical exercise reports	60.0%	40.0%

Recommended reading

Basic literature

1. Ronkowski M., Michna M., Kostro G., Kutt F.: Maszyny elektryczne wokół nas: zastosowanie, budowa, modelowanie, charakterystyki, projektowanie. (e-skrypt) Wyd. PG, Gdańsk, 2009/2011.
2. Matulewicz W.: Podstawy teorii maszyn elektrycznych, Wyd. PG, Gdańsk 2014
3. Matulewicz W., Chomiakow M: Badania podstawowe maszyn elektrycznych. Wyd. PG, Gdańsk 2014
4. Roszczyk S.: Teoria maszyn elektrycznych. WNT, W-wa 1979
5. J. F. Gieras, Electrical Machines: Fundamentals of Electromechanical Energy Conversion, 1st Edition. Boca Raton: CRC Press, 2016

	Supplementary literature	1. Fitzgerald A.E, Kingsley Ch. (Jr.), Umans S. D.: Electric Machinery. New York: McGraw-Hill Book Comp. 2003. Gieras J. F.: Advancements In Electric Machines, Springer, 2008. 2. Rafalski W., Ronkowski M.: Zadania z Maszyn Elektrycznych, cz. I, II. Wyd. 4/3 (skrypty) Wyd. PG, Gdańsk 1994. 3. Plamitzer A.: Maszyny elektryczne. WNT, W-wa 1976. 4. Manitius Z.: Transformatory. Maszyny prądu stałego. Maszyny Synchroniczne. Maszyny asynchroniczne. (seria skryptów). Wyd. PG, Gdańsk 1973 - 1978. 5. Latek W.: Teoria Maszyn Elektrycznych. WNT, W-wa, 1982. 6. Staszewski P., Urbański W.: Zagadnienia obliczeniowe w eksploatacji maszyn elektrycznych, Warszawa, Oficyna Wydawnicza Politechniki Warszawskiej 2009
	eResources addresses	Adresy na platformie eNauczanie:
Example issues/ example questions/ tasks being completed		
Work placement	Not applicable	

Document generated electronically. Does not require a seal or signature.