



## Subject card

Subject name and code	Electric Machines, PG_00038436						
Field of study	Hydrogen Technologies and Electromobility						
Date of commencement of studies	October 2026	Academic year of realisation of subject			2027/2028		
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 -> Faculties of Gdańsk University of Technology						
Name and surname of lecturer (lecturers)	Subject supervisor	dr hab. inż. Michał Michna					
	Teachers						
Lesson types	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 construction, 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 electrolyzers, 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	[SW3] Assessment of knowledge contained in written work and projects [SW1] Assessment of factual knowledge
	[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.	[SK4] Assessment of communication skills, including language correctness [SK3] Assessment of ability to organize work
	[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.	[SK4] Assessment of communication skills, including language correctness [SK3] Assessment of ability to organize work [SK1] Assessment of group work skills
[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	
Subject contents	<p>Course content – lecture</p> <p><b>LECTURE:</b> 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. <b>LABORATORY</b> 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 eNauczenie platform.</p>		
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	<ol style="list-style-type: none"> <li>Ronkowski M., Michna M., Kostro G., Kutt F.: Maszyny elektryczne wokół nas: zastosowanie, budowa, modelowanie, charakterystyki, projektowanie. (e-skrypt) Wyd. PG, Gdańsk, 2009/2011.</li> <li>Matulewicz W.: Podstawy teorii maszyn elektrycznych, Wyd. PG, Gdańsk 2014</li> <li>Matulewicz W., Chomiakow M: Badania podstawowe maszyn elektrycznych. Wyd. PG, Gdańsk 2014</li> <li>Roszczyk S.: Teoria maszyn elektrycznych. WNT, W-wa 1979</li> <li>J. F. Gieras, Electrical Machines: Fundamentals of Electromechanical Energy Conversion, 1st Edition. Boca Raton: CRC Press, 2016</li> </ol>	

	Supplementary literature	<ol style="list-style-type: none"> <li>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.</li> <li>2. Rafalski W., Ronkowski M.: Zadania z Maszyn Elektrycznych, cz. I, II. Wyd. 4/3 (skrypty) Wyd. PG, Gdańsk 1994.</li> <li>3. Plamitzer A.: Maszyny elektryczne. WNT, W-wa 1976.</li> <li>4. Manitus Z.: Transformatory. Maszyny prądu stałego. Maszyny Synchroniczne. Maszyny asynchroniczne. (seria skryptów). Wyd. PG, Gdańsk 1973 - 1978.</li> <li>5. Latek W.: Teoria Maszyn Elektrycznych. WNT, W-wa, 1982.</li> <li>6. Staszewski P., Urbański W.: Zagadnienia obliczeniowe w eksploatacji maszyn elektrycznych, Warszawa, Oficyna Wydawnicza Politechniki Warszawskiej 2009</li> </ol>
Example issues/ example questions/ tasks being completed	eResources addresses	
Practical activities within the subject	Not applicable	

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