GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Electric Machines, PG_00038436						
Field of study	Electrical Engineering						
Date of commencement of studies	October 2026		Academic year of realisation of subject	2027/2028			
Education level	first-cycle studies		Subject group				
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 inż. Grzegorz Kostro					
	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	To provide students with: general principles of construction and physical performance of electrical machines; principles of construction, modeling and performance characteristics of power transformers; principles of construction, modeling and performance characteristics of dc machines; principles of construction, modeling and performance characteristics of synchronous machines; principles of construction, modeling and performance characteristics of induction machines; general principles of electrical machines design.						

Learning outcomes

Course outcome	Subject outcome	Method of verification
K6_K02	carries out tasks in a group, taking on different roles during classes	[SK1] Assessment of group work skills
K6_U11	selects measuring devices to perform basic measurements in electrical installations. performs measurements. assesses the condition of the device based on the measurements performed	[SU2] Assessment of ability to analyse information
K6_K05	performs work in accordance with the rules applicable when working with electrical equipment	[SK4] Assessment of communication skills, including language correctness
K6_K01	carries out self-education by reading current technical literature and searching for information on the issues analyzed	[SK5] Assessment of ability to solve problems that arise in practice
K6_W06	defines the general principles of construction and the physical basis of operation of electric machines, explains the construction, operation and modelling of transformers, calculates and explains the operating characteristics of transformers, defines the construction, operation and modelling of DC machines, calculates and explains the operating characteristics of DC machines, defines the construction, operation and modelling of synchronous machines, calculates and explains the operating characteristics of synchronous machines, defines the construction, operation and modelling of induction machines, calculates and explains the operating characteristics of induction machines, defines the general principles of designing electric machines.	[SW1] Assessment of factual knowledge

Subject contents

Course content – lecture
LECTURE Types and methods of generating magnetic fields. Generation of electromagnetic torque and induced voltages. Classification of electric machines. Design, operating principle and properties of single- and three-phase transformers. Design, operating principle and motion properties of direct current and alternating current electric machines. General principles of speed regulation of electric motors. Regulatory properties of rotating generators.

LABORATORY EXERCISES Measurements of parameters of a three-phase transformer and asynchronous machine circuit model. Properties of the generator operation of a separate synchronous machine and its properties during parallel operation in the power network. Properties of a separately excited direct current motor and a shunt direct current generator. Possibility of carrying out a virtual tour inside the wind turbine gondola 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
Practical exercise	60.0%	60.0%
Written exam	60.0%	40.0%

Recommended reading	Basic literature	1. Latek W.: Zarys maszyn elektrycznych. WNT, W-wa 1974. 2. Manitius Z.: Transformers. DC machines. Synchronous machines. Asynchronous machines (series of textbooks in Polish). Wyd. Pol. Gd., Gdańsk 1973 - 1978. 3. Matulewicz W.: Maszyny elektryczne. Podstawy (textbook in Polish). Wyd. PG, Gdańsk 2005. 4. Plamitzer A.: Maszyny elektryczne. WNT, W-wa 1976. 5. Roszczyk S.: Teoria maszyn elektrycznych. WNT, W-wa 1979. 6. Ronkowski M., Michna M., Kostro G., Kutt F.: Maszyny elektryczne wokół nas: zastosowanie, budowa, modelowanie, charakterystyki, projektowanie. Wyd. PG, Gdańsk, 2009/2011 (e-book, access at : POMORSKA BIBLIOTEKA CYFROWA) 7. Ronkowski M., Michna M., Kostro G.: Laboratory of electrical machines (in Polish). Wydz. EiA PG, Gdańsk 2012-2013. (set of instructions, access at internet).
	Supplementary literature	1. Fitzgerald A.E.: Electric Machinery. 6th edition. McGraw-Hill Book Comp., New York 2003. 2. Rafalski W., Ronkowski M.: Zadania z maszyn elektrycznych. Part. I i II (textbooks in Polish). Wyd. PG, Gdańsk 1994. 3. Staszewski P., Urbański W., Zagadnienia obliczeniowe w eksploatacji maszyn elektrycznych, Warszawa, Oficyna Wyd. PW, Warszawa 2009.
	eResources addresses	
Example issues/ example questions/ tasks being completed	• Explain the purpose of the no-load and short-circuit tests of transformer. • For a given data of no-load test measurements of a transformer calculate: no-load current (in A and %), core losses and equivalent circuit parameters (in ohms and %). • For a given data of short-circuit test measurements of a transformer calculate: short-circuit (in V and %), winding losses (in W and %); equivalent circuit parameters (in ohms and %); steady-sate short-circuit (in A and %) at rated supply voltage.	
Practical activites within the subject	Not applicable	

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