



## Subject card

Subject name and code	Electric Machines, PG_00049755						
Field of study	Power Engineering, Power Engineering						
Date of commencement of studies	October 2021	Academic year of realisation of subject				2022/2023	
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				English	
Semester of study	4	ECTS credits				6.0	
Learning profile	general academic profile	Assessment form				exam	
Conducting unit	Department of Power Electronics and Electrical Machines -> Faculty of Electrical and Control Engineering						
Name and surname of lecturer (lecturers)	Subject supervisor		dr hab. inż. Andrzej Wilk				
	Teachers		dr hab. inż. Andrzej Wilk dr inż. Filip Kutt				
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	30.0	15.0	30.0	0.0	0.0	75
	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	75		11.0		64.0	150
Subject objectives	This lecture is designed to satisfy modern requirements by providing basic understanding of the nature and operating principles of transformers, asynchronous machines, synchronous machines and DC machines.						
Learning outcomes	Course outcome		Subject outcome			Method of verification	
	[K6_W03] knows the basics of automation and automatic regulation, knows the principles of the selection of electrical devices, drive systems and their control						
	[K6_W05] has structured knowledge in the field of electrical engineering and electronics, necessary to understand the basics of operation and selection of electrical machines, electricity transmission systems and power electronic devices		The student has knowledge of electrical engineering necessary to understand the basics of electrical machines			[SW3] Assessment of knowledge contained in written work and projects	
	[K6_U03] has the preparation necessary to work in an industrial environment, applies the principles of occupational health and safety, can perform diagnostics of the regulation system of a simple energy facility		The student knows the safety rules for the operation of electrical machines			[SU3] Assessment of ability to use knowledge gained from the subject	
Subject contents	Principles of transformers. Circuit representations of transformers. Transformer losses and efficiency. Component fluxes and inductances. Multi-winding transformers. Three-phase connections of transformers. Principles of induction machines. Induction motor equivalent circuits in steady state. Performance evaluation from the equivalent circuit. Operating characteristics. Transient states in induction motor - general. Speed control of induction machines. Principles of synchronous machines, Reactances and effects of saliency. The circuit equivalent model. Steady-state characteristics and phasor diagrams. Armature reaction. Transient performance of synchronous machines. Permanent magnet synchronous machines.						
Prerequisites and co-requisites	Basic knowledge of electrical engineering						
Assessment methods and criteria	Subject passing criteria		Passing threshold			Percentage of the final grade	
	Test		60.0%			100.0%	

Recommended reading	Basic literature	<p>[1] Roszczyk S.: Teoria maszyn elektrycznych, WNT Warszawa, 1979 r.</p> <p>[2] Thaler G.J., Wilcox M.: Electric machines: Dynamics and Steady State, Wiley, New York, London, Sydney, 1966.</p> <p>[3] Sen P.C.: Principles of electric machines and power electronics, Wiley, USA, 2012.</p> <p>[4] Gerling D.: Electrical machines. Mathematical fundamentals of machine topologies, Springer, - Verlag, berlin, Heidelberg 2015.</p>
	Supplementary literature	Ronkowski M., Michna M., Kostro G., Kutt F.: Maszyny elektryczne wokół nas, Wydawnictwo Politechniki Gdańskiej, Gdańsk 2011
	eResources addresses	
Example issues/ example questions/ tasks being completed	<ol style="list-style-type: none"> <li>1. Open and short-circuit test of transformers.</li> <li>2. Equivalent circuit of induction motor.</li> <li>3. Generator volt-ampere characteristic</li> </ol>	
Work placement	Not applicable	