



Subject card

Subject name and code	Electric Machines, PG_00049755						
Field of study	Power Engineering, Power Engineering, Power Engineering, Power Engineering, Power Engineering						
Date of commencement of studies	October 2020	Academic year of realisation of subject			2021/2022		
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 inż. Filip Kutt dr hab. inż. Andrzej Wilk				
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 Adresy na platformie eNauczanie:						
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_W05	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	The student knows the safety rules for the operation of electrical machines			[SU3] Assessment of ability to use knowledge gained from the subject		
	K6_K03	The student is able to operate in emergency situations of electrical machines			[SK3] Assessment of ability to organize work		
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"> 1. Open and short-circuit test of transformers. 2. Equivalent circuit of induction motor. 3. Generator volt-ampere characteristic 	
Work placement	Not applicable	