GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Electric Machines, PG_00049755		
Field of study	Power Engineering		
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	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 -> Faculties of Gdańsk University of Technology		
Name and surname of lecturer (lecturers)	Subject supervisor		
	Teachers		

Lesson types

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 tranaformers, asynchronous machines, synchronous machines and DC machines.

Learning outcomes

Course outcome	Subject outcome	Method of verification
[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
[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_W03] knows the basics of automation and automatic regulation, knows the principles of the selection of electrical devices, drive systems and their control		

Subject contents

Course content – lecture
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

<table>
<tr><td>Assessment methods and criteria</td><td colspan="3"><table><tr><th>Subject passing criteria</th><th>Passing threshold</th><th>Percentage of the final grade</th></tr><tr><td>Test</td><td>60.0%</td><td>100.0%</td></tr></table></td></tr>
<tr><td rowspan="3">Recommended reading</td><td>Basic literature</td><td colspan="2">[1] Roszczyk S.: Teoria maszyn elektrycznych, WNT Warszawa, 1979 r.

[2] Thaler G.J., Wilcox M.: Electric machines: Dynamics and Steady State, Wiley, New York, London, Sydney,1966.

[3] Sen P.C.: Principles of electric machines and power electronics, Wiley, USA, 2012.

[4] Gerling D.: Electrical machines. Mathematical fundamentals of machine topologies, Springer, - Verlag, berlin, Heidelberg 2015.</td></tr>
<tr><td>Supplementary literature</td><td colspan="2">Ronkowski M., Michna M., Kostro G., Kutt F.: Maszyny elektryczne wokół nas, Wydawnictwo Politechniki Gdańskiej, Gdańsk 2011</td></tr>
<tr><td>eResources addresses</td><td colspan="2"></td></tr>
<tr><td>Example issues/ example questions/ tasks being completed</td><td colspan="3">1. Open and short-circuit test of transformers.

2. Equivalent circuit of induction motor.

3. Generator volt-ampere characteristic</td></tr>
<tr><td>Practical activites within the subject</td><td colspan="3">Not applicable</td></tr>
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