



Subject card

Subject name and code	Advanced Electrical Energy Conversion, PG_00066976						
Field of study	Smart Renewable Energy Engineering						
Date of commencement of studies	October 2025		Academic year of realisation of subject			2025/2026	
Education level	second-cycle studies		Subject group			Specialty subject group 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	1		Language of instruction			English	
Semester of study	2		ECTS credits			2.0	
Learning profile	general academic profile		Assessment form			assessment	
Conducting unit	Department of Power Electronics and Electrical Machines -> Faculty of Electrical and Control Engineering -> Wydział Politechniki Gdańskiej						
Name and surname of lecturer (lecturers)	Subject supervisor		dr hab. inż. Michał Michna				
	Teachers						
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	10.0	0.0	20.0	0.0	0.0	30
	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	30		4.0		16.0	50
Subject objectives	The student will learn the general structure and function of the members of the electromechanical system: - construction, operation and modeling of generator and drive assemblies. - construction, operation and modeling of power electronic converter systems - construction and modeling and algorithms of regulation						
Learning outcomes	Course outcome		Subject outcome			Method of verification	
	[K7_U02] is capable of creating and analyzing digital models of renewable energy systems, including wind power systems, and utilizes digital tools for project analysis, evaluation, supervision, and optimization		The student has in-depth knowledge of electromechanical systems			[SU2] Assessment of ability to analyse information	
	[K7_K02] recognizes technological innovations in the field of wind energy, is ready to adapt to and implement new technologies in energy systems		The student is able to model electromechanical systems and perform computer simulations			[SK2] Assessment of progress of work	
	[K7_W04] knows the specifics of designing, constructing, and operating onshore/offshore wind farms, as well as the technical and logistical challenges involved in their implementation, including measurement and diagnostic technologies		The student has the ability to interpret and correctly analyze the results of simulation and experimental studies.			[SW1] Assessment of factual knowledge	
Subject contents	Definition and functions of an electromechanical system (EMS). SE components and their functions. Trends in SE development. Practical SE structures. Machine assemblies used in wind power. Fundamentals of SE modelling, simulation and design using CAD techniques. SE modelling methods from an energy perspective.						
Prerequisites and co-requisites	General knowledge of the subjects Electrical Machines, Electronics, ability to analyze electric and magnetic circuits in steady and transient states, ability to analyze the operation of electrical machines in steady states.						
Assessment methods and criteria	Subject passing criteria		Passing threshold			Percentage of the final grade	
	Test		60.0%			50.0%	
	Laboratory		60.0%			50.0%	

Recommended reading	Basic literature	1. Gieras J.: Advancements in electric machines. Springer Netherlands, 2008. 2. Lyshevski S. E., Nano- and micro-electromechanical systems: Fundamental of micro- and nano-engineering. CRC Press, 2000.
	Supplementary literature	Karnopp D. C., Margolis D. L., Rosenberg R. C.: System dynamics, modeling and simulation of mechatronic systems. John Wiley Inc, 2000. 2. Lyshevski S. E.: Electromechanical systems, electric machines, and applied mechatronics. CRC Press, 2000.
	eResources addresses	
Example issues/ example questions/ tasks being completed	Draw and describe a general structure of electromechanical system. Draw and describe the physical and dynamic circuit models, and dynamic characteristics of dc motor. Calculate the circuit model parameters and time constant of dc motor using its manufacturing data sheet.	
Work placement	Not applicable	

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