



Subject card

Subject name and code	Modeling and computer simulation in power electronic systems, PG_00044112						
Field of study	Electrical Engineering						
Date of commencement of studies	October 2022		Academic year of realisation of subject		2024/2025		
Education level	first-cycle studies		Subject group				
Mode of study	Full-time studies		Mode of delivery		at the university		
Year of study	3		Language of instruction		English		
Semester of study	5		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						
Name and surname of lecturer (lecturers)	Subject supervisor		dr hab. inż. Piotr Musznicki				
	Teachers						
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	15.0	0.0	0.0	15.0	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		5.0		15.0	50
Subject objectives	Get basic knowledge and skill on circuit oriented modelling and simulation of power electronic systems						
Learning outcomes	Course outcome		Subject outcome		Method of verification		
	K6_W10						
	K6_U09						
	K6_U10						
	K_K05						
	K6_K01		Student extends skills on team working and presentation of project results.		[SK4] Assessment of communication skills, including language correctness [SK1] Assessment of group work skills		
Subject contents	1) Classification of modeling levels: component, behavioral, functional. Methods of numerical computation of dynamic systems. 2) Simulation methodology of power electronic converters. Survey of general purpose simulation software: LTspice, Matlab-Simulink, Saber-Mast. 3) TCad 8: circuit oriented power electronic simulation software. 4) Specifying parameters of elements in TCad: resistor, capacitor, inductor, transformer, power electronic switches. Models of electrical machines, mechanical loads and controllers. 5) Functional models. 6-7) Control modules in user-defined units.						
Prerequisites and co-requisites	Basic knowledge on power electronics and electrical drives.						
Assessment methods and criteria	Subject passing criteria		Passing threshold		Percentage of the final grade		
	project		50.0%		50.0%		
	lecture		50.0%		50.0%		
Recommended reading	Basic literature		1. R. Szczesny, Komputerowa symulacja układów energo-elektronicznych, Wydawnictwo Politechniki Gdańskiej 1999. 2. M. Wilamowski, J.David Irwin (ed.) The industrial Electronics Handbook: Power electronics and motor drives, CRC Taylor & Francis Group 2nd edition 2011 3. K. Zawirski, J. Deskur, T. Kaczmarek, Automatyka napędu elektrycznego. Wydaw. Politechniki Poznańskiej 2012.				

	Supplementary literature	<p>1. J. Nieznański, K. Iwan, R. Szczęsny, M. Ronkowski, TCad for Windows, Softech 1996</p> <p>2. A.-R. Haithem, A. Iqbal, J. Guziński, High performance control of ac drives with Matlab/Simulink, John Wiley & Sons 2021</p>
	eResources addresses	Adresy na platformie eNauczanie:
Example issues/ example questions/ tasks being completed	Explain differences between behavioral and functional modeling on the example of pulse width modulation voltage source inverter.	
Work placement	Not applicable	