



Subject card

Subject name and code	Modeling and Simulation in Electrical Engineering, PG_00017679						
Field of study	Electrical Engineering						
Date of commencement of studies	October 2021	Academic year of realisation of subject			2023/2024		
Education level	first-cycle studies	Subject group					
Mode of study	Part-time studies	Mode of delivery			at the university		
Year of study	3	Language of instruction			Polish		
Semester of study	5	ECTS credits			4.0		
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 inż. Krzysztof Iwan					
	Teachers	dr inż. Krzysztof Iwan					
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	20.0	10.0	0.0	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		3.0		67.0	100
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_U05	Student follows the regulations of the computer laboratory			[SU1] Assessment of task fulfilment		
	K6_K05	Student knows about the threats to health and life during use electrical devices			[SK1] Assessment of group work skills [SK3] Assessment of ability to organize work		
	K6_W11	Student is able to use simulation software to define model of control of power converters			[SW3] Assessment of knowledge contained in written work and projects		
	K6_W10	Student has knowledge of the circuit models of the electric drive systems			[SW3] Assessment of knowledge contained in written work and projects		
	K6_W09	Student determines the requirements for models of power system components			[SW3] Assessment of knowledge contained in written work and projects		
	K6_U11	The student has knowledge of the measurement procedures of electric circuits			[SU1] Assessment of task fulfilment		
	K6_U09	Student is able to carry out measurements and computer simulation of the operating states of the electric drive system including damage			[SU3] Assessment of ability to use knowledge gained from the subject [SU1] Assessment of task fulfilment		
	K6_K01	Student extends skills on team working and presentation of project results.			[SK2] Assessment of progress of work [SK5] Assessment of ability to solve problems that arise in practice		
Subject contents	1) Classification of modeling levels: component, behavioral, functional. Methods of numerical computation of dynamic systems. 2) Simulation methodology of power electronic converters. 3-4) Survey of general purpose simulation software: PLECS, TCad. 5) Specifying parameters of elements in PLECS and TCad: resistor, capacitor, inductor, transformer, power electronic switches. Models of electrical machines, mechanical loads and controllers. 6) Functional models. 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	<ol style="list-style-type: none"> 1. Szczęsny R., Komputerowa symulacja układów energoelektronicznych, Gdańsk : Wydaw. Politechniki Gdańskiej, 1999 2. Serafin E.: Modelowanie urządzeń w elektroenergetyce. TTS 10/2013, 3. Głąb M., Judek S., Skibicki J., Komputerowe modelowanie układów przekształtnikowych przy wykorzystaniu różnych programów symulacyjnych analiza porównawcza, Zeszyty Naukowe WEiA PG Nr 21, 2005 4. Pierz P.: Symulacyjne metody analizy funkcjonowania układów automatyki elektroenergetycznej. elektro.info 11/2018 2018-12-12 	
	Supplementary literature	1. J. Nieznański, K. Iwan, R. Szczęsny, M. Ronkowski, TCad for Windows, Softech 1996	
	eResources addresses	Adresy na platformie eNauczanie: MODELOWANIE I SYMULACJA W ELEKTROTECHNICE [Niestacjonarne][2023/24] - Moodle ID: 32242 https://enauczanie.pg.edu.pl/moodle/course/view.php?id=32242	
Example issues/ example questions/ tasks being completed	Develop a PLECS model of a single-phase 12V/230V 100W inverter and, based on simulation, determine the requirements for the inverter transistors.		
Work placement	Not applicable		