

COURSE DESCRIPTION CARD – SPECIMEN

Faculty of Electrical Engineering									
Field of study	Electrical and Electronics Engineering							Degree level and programme type	Bachelor's degree,
Specialization/ diploma path								Study profile	
Course name	Control of Electrical Drives 1							Course code	IS-FEE-10069W
								Course type	elective
Forms and number of hours of tuition	L	C	LC	P	SW	FW	S	Semester	winter
	15	-	15	30	-	-	-	No. of ECTS credits	6
Entry requirements									
Course objectives	The introduction into the construction and the features analysis methods of the electrical drives for energy conversion and for torque, speed and position control.								
Course content	<p>Lecture: Control characteristic of motor and power converter. Torque - speed characteristics of electrical motors, generators and the automatically controlled drives. Multi-quadrant operation of the converter controlled DC and AC drives. Power flow and energy losses in electric drives. Structure and synthesis of simple drive system subsystems. Quality control assessment.</p> <p>Laboratory classes: Investigation into speed control system with DC servomotor motor drive, investigation into steady state and transient features. Investigation into position measurement system with resolver in the sine – cosine operating mode. Investigation into position measurement system with resolver in the phase shifter operating mode. Investigation into control characteristic of variable speed control system with induction motor, DC/AC converter and frequency adjustment.</p> <p>Project: The student designs and simulates in Matlab the automatically controlled electric servodrive.</p>								
Teaching methods	lecture, laboratory experiments, demonstration, problem-based learning, small group teaching, work on a project								
Assessment method	lecture – oral test, laboratory classes – evaluation of reports, project – evaluation of project								
Symbol of learning outcome	Learning outcomes							Reference to the learning outcomes for the field of study	
	Knowledge: the graduate knows and understands								
LO1	basic functional blocks in structure of electric drive system								
	Skills: the graduate is able to								

L02	analyze power flow and energy losses in a simple drive system	
L03	determine the basic properties of electric drive	
L04	design and simulates of simple electric drive	
L05		
L06		
Symbol of learning outcome	Methods of assessing the learning outcomes	Type of tuition during which the outcome is assessed
L01	tests on lecture content	L
L02	assessment of the drive operation, evaluating of the student's reports and performance in classes	LC
L03	assessment of the drive operation, evaluating the student's reports and performance in classes	LC
L04	evaluating the student's project	P
L05		
L06		
Student workload (in hours)		No. of hours
Calculation	lecture attendance	15h
	participation in laboratory classes	15h
	participation in project	30h
	participation in student-teacher sessions	5
	preparation for laboratory classes, project	30h
	working on laboratory reports,	20h
	working on project	20h
	preparation for exam	10h
	TOTAL:	150h
Quantitative indicators		HOURS
Student workload – activities that require direct teacher participation		65h
Student workload – practical activities		110h
Basic references	<p>1. Weidauer Jens: "Electrical drives: principles, planning, applications, solutions", Erlangen: Publicis Publishing, 2014.</p> <p>2. Mohan N.: "Advanced electric drives: analysis, control and modelling using MATLAB/Simulink", Hoboken: John Willey and sons, 2014.</p> <p>3. Seung-Ki Sul: "Control of Electric Machine Drive Systems", IEEE Press, A John Willey and sons, INC, Publication, USA, 2011.</p> <p>4. Weidauer J. "Electrical drives : principles, planning, applications, solutions." Erlangen: Publicis Publishing, 2014.</p> <p>5. Wilamowski B. M., Irwin J.D. "Control and Mechatronics", Taylor and Francis, USA, 2011.</p>	
Supplementary references	<p>1. Seung-Ki Sul: „Control of Electric Machine Drive Systems”, IEEE Press, A John Willey and sons, INC, Publication, USA, 2011.</p> <p>2. Leonard W. "Control of Elektric Drives", 3rd Edition, Springer-Verlag, Berlin, 2001.</p>	

	3. .Alahakoon Sanath: "Digital Control Techniques for Sensorless Electrical Drives", VDM Verlag Dr Muller, Germany, 2009. 4. Wilamowski B. M., Irwin J.D. "Control and Mechatronics", Taylor & Francis, USA, 2011. 5. Chang Y. "Crucial problems of powertrain control in electric vehicles and hybrid electric vehicles", Oficyna Wydawnicza Politechniki Warszawskiej, Warszawa, 2019.	
Organisational unit conducting the course	DEPARTMENT OF ELECTROTECHNICS, POWER ELECTRONICS AND POWER ENGINEERING	Date of issuing the programme
Author of the programme	Andrzej Andrzejewski, PhD Eng.	02.02.2023

L – lecture, C – classes, LC – laboratory classes, P – project, SW – specialization workshop, FW - field work,

S – seminar