Załącznik nr 2 do Zarządzenia Nr 915 z 2019 r. Rektora PB

COURSE DESCRIPTION CARD – SPECIMEN

<table>
<tr><td colspan="10">Faculty of Mechanical Engineering</td></tr>
<tr><td>Field of study</td><td colspan="6">Mechatronics/Mechanics/Automatics/ Electrotechnics/Control Engineering</td><td>Degree level and programme type</td><td>Bachelor's degree/Master's degree/Doctoral degree</td></tr>
<tr><td>Specialization/ diploma path</td><td colspan="6">-</td><td>Study profile</td><td>-</td></tr>
<tr><td rowspan="2">Course name</td><td colspan="6" rowspan="2">Instrumentation of Control Systems</td><td>Course code</td><td>IS-MER0022W</td></tr>
<tr><td>Course type</td><td>obligatory/elective</td></tr>
<tr><td rowspan="2">Forms and number of hours of tuition</td><td>L</td><td>C</td><td>LC</td><td>P</td><td>SW</td><td>FW</td><td>S</td><td>Semester</td><td>5</td></tr>
<tr><td>30</td><td>-</td><td>-</td><td>45</td><td>-</td><td>-</td><td>-</td><td>No. of ECTS credits</td><td>5</td></tr>
<tr><td>Entry requirements</td><td colspan="9">electrotechnics, electronics, electric drive systems, metrology and measurement systems, mechatronics, control engineering</td></tr>
<tr><td>Course objectives</td><td colspan="9">To know the structure and the operation principles of selected electrical drives (DC and AC), stepper motors, servomotors and their industrial applications. To know the functions, structure, advantages and disadvantages of selected control circuits with contactors, stable and unstable switches, power relays, etc. To acquire the skills in configuring and programming of the selected power inverters. To use electrical drives with rotational and linear modules in modern control systems and industrial applications.</td></tr>
<tr><td>Course content</td><td colspan="9">Investigations of the DC series motor, 1-phase AC motor capacitor with capacitor, 3-phases AC motor. Operations with computer braking stand. Hand and automatic measurements of the electrical and mechanical characteristics of the selected motors. Investigations of the functions, structure, advantages and disadvantages of the control system instruments. Configuring and programming of the selected power inverters. Electrical drives with rotational and linear modules in modern control systems and industrial applications.</td></tr>
<tr><td>Teaching methods</td><td colspan="9">lecture, classes, laboratory classes, project, specialization workshop, seminar</td></tr>
<tr><td>Assessment method</td><td colspan="9">lecture - written tests
project - classes active attendance, written report and oral exam</td></tr>
<tr><td>Symbol of learning outcome</td><td colspan="7">Learning outcomes</td><td colspan="2">Reference to the learning outcomes for the field of study</td></tr>
<tr><td>LO1</td><td colspan="7">describes, draws and explains the structure and principle of operation of selected electrical drives, power inverters, contactors and power relays</td><td colspan="2"></td></tr>
<tr><td>LO2</td><td colspan="7">applies and programs selected power inverters for simple control systems</td><td colspan="2"></td></tr>
<tr><td>LO3</td><td colspan="7">selects the type and tunes the controller parameters and experiments with the electric control system with rotational and linear modules</td><td colspan="2"></td></tr>
<tr><td>LO4</td><td colspan="7">take measurements hand and automatic measurements of electromechanical quantities, determines static and dynamic characteristics of the motors and electrical drive control systems</td><td colspan="2"></td></tr>
<tr><td>LO5</td><td colspan="7">applies dedicated software in order to engineering project problems</td><td colspan="2"></td></tr>
<tr><td>LO6</td><td colspan="7">uses industrial safety rules and works in a team</td><td colspan="2"></td></tr>
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Symbol of learning outcome	Methods of assessing the learning outcomes	Type of tuition during which the outcome is assessed	
LO1	lecture: written tests	L, P	
LO2	project: observation and active attendance in classes, project defence	L, P	
LO3	lecture: written tests	L, P	
LO4	project: observation and active attendance in classes, project defence	L, P	
LO5	lecture: written tests	P	
LO6	project: observation and active attendance in classes, project defence	P	
Student workload (in hours)		**No. of hours**	
Calculation	lecture attendance	30	
	participation in project classes	45	
	preparation for classes, projects, seminars, etc.	15	
	working on projects, reports, etc.	15	
	participation in student-teacher sessions related to the classes/seminar/project	5	
	implementation of project tasks	4	
	preparation for and participation in exams/tests	4	
	TOTAL:	**118**	
Quantitative indicators		**HOURS**	**No. of ECTS credits**
Student workload – activities that require direct teacher participation		84	3
Student workload – practical activities		34	2
Basic references	1. Isermann R., Mechatronic Systems Fundamentals, Springer, 2005 2. Ogata K., Modern Control Engineering, 4th ed., Pearson Education International, 2002. 3. Dorf R.C., Bishop R.H., Modern Control Systems, 10th Edition, Prentice Hall, 2005. 4. Tewari A., Modern Control Design: With Matlab and Simulink, Wiley-IEEE Press, 2001. 5. Bequette B.W., Process Control, Modeling, Design and Simulation, Prentice Hall, 2003.		
Supplementary references	1. Gieras J. F., Gieras F., Tomczuk B. Z.: Linear synchronous motors: Transportation and automation systems,CRC/Taylor & Francis, 2012 2. Wildi T.i: Electrical Machines, Drives and Power Systems, Sixth Edition, Pearson Education International, 2006 3. Górski P: Wzmacniacze operacyjne (in Polish). BTC, Warszawa, 2002. 4. Nawrocki W.: Rozproszone systemy pomiarowe (in Polish). WKŁ, Warszawa 2006. 5. Trybus L.: Regulatory wielofunkcyjne (in Polish). WNT, Warszawa, 1992.		
Organisational unit conducting the course	Department of Robotics and Mechatronics	**Date of issuing the programme**	
Author of the programme	Mirosław Kondratiuk, PhD Eng.	10.03.2021	

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

Please notice!
Depending on number of students enrolled for the subject hours of tuition are as follows (for each 30 hours given in course description card):
1 – 2 students - 8 hours of tuition hours;
3 – 4 students - 12 hours of tuition;
5 – 6 students - 17 hours of tuition;
7 – 8 students - 21 hours of tuition;
9 and more students - hours of tuition given by a teacher as regular classes.