Załącznik nr 2 do Zarządzenia Nr 16/2022 Rektora PB

COURSE DESCRIPTION CARD

<table>
<tr><td colspan="10">Bialystok University of Technology
Faculty of Mechanical Engineering</td></tr>
<tr><td>Field of study</td><td colspan="6">Erasmus</td><td>Degree level and programme type</td><td>Bachelor’s degree</td></tr>
<tr><td>Specialisation/ diploma path</td><td colspan="6">-</td><td>Study profile</td><td>academic</td></tr>
<tr><td rowspan="2">Course name</td><td colspan="6" rowspan="2">Automation and robotization of processes</td><td>Course code</td><td></td></tr>
<tr><td>Course type</td><td></td></tr>
<tr><td rowspan="2">Forms and number of hours of educational activities</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>Summer+winter</td></tr>
<tr><td>30</td><td></td><td>15</td><td>15</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">Automation, Programming of control systems, Introduction to robotics</td></tr>
<tr><td>Course objectives</td><td colspan="9">The main objective of this module is provide students with modelling and describing systems for automation and robotization of industrial processes.
Teaching the principles of modelling discrete and continuous processes applied in various branches of industry, and of designing algorithms to control these processes. Students learn to model the course of industrial processes and to design switching systems, and also get to know the latest technologies for automation and robotization of industrial processes that make up the so-called 'smart factory' as well as the basics of automated production management systems and automation and robotization of processes according to the Fourth Industrial Revolution.</td></tr>
<tr><td>Course content</td><td colspan="9">Lecture: Trends in technological development. Automation and robotization of processes according to the Fourth Industrial Revolution. Principles and objectives of discrete and continuous process automation. Production management architecture. Programming methods. Process description methods. Programming languages and algorithms: Grafcet, operational networks, Elements of industrial process systems (measuring, executive control, communication and SCADA systems). Automation and robotization of selected production/technological processes. Automation of decision-making processes in production planning and execution. Understanding electrical and signal diagrams: automation systems: relays, contactors, coils, digital and analogue PLC I/O connections, safety and security elements. Robotic systems - construction, operation and
control. Robots and manipulators in industrial processes (assembly, packaging, transport, etc.). Selection of robot and manipulator configurations. Flexible robotic production cells. Cooperation of robots and manipulators with humans. Hybrid
systems. Designing flexible robotic systems. Decentralized control systems of robotic cells. Remote management of industrial robots. Project classes:</td></tr>
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	designing control systems with the use of the Tia Portal software and next testing the control algorithm to real controller, Master-Slave communication **Laboratory classes**: Programming of selected robotic systems and selected PLC controllers on the lab stand	
Teaching methods	**Lectures:** multimedia presentations and showing some examples, discussions **Project:** work in groups, discussion, homework assignments **Laboratory classes::** work in groups, discussion	
Assessment method	**Lectrue:** test**, Project:** evaluation report**, Laboratory classes:** evaluation reports and test	
Symbol of learning outcome	**Learning outcomes**	**Reference to the learning outcomes for the field of study**
	Knowledge: the graduate knows and understands	
LO1	know the structure, components and operation of automated and robotized industrial processes	**MK1_W03**
LO2	know tools and methods for modelling and describing the course of automated and robotized industrial processes and for building control algorithms	**MK1_W05, MK1_W06**
LO3	know automation methods in production process management	**MK1_W06**
	Skills: the graduate is able to	
LO4	can create algorithms and program the execution of automated industrial processes, using different robot/manipulator configurations	**MK1_U06, MK1_U10**
LO5	can formulate assumptions, read wiring diagrams, and also draw supply and signal electrical connections and electro-mechanical/pneumatic/hydraulic connections	**MK1_U07, MK1_U08**
	Social competence: the graduate is ready to	
LO6	can critically evaluate their knowledge of automation and robotization of industrial processes	**MK1_K01**
Symbol of learning outcome	**Methods of assessing the learning outcomes**	**Type of tuition during which the outcome is assessed**
LO1	test	**L**
LO2	test	**L**
LO3	evaluation report or test	**LC/P**
LO4	evaluation report or test	**LC**
LO5	evaluation report or test	**L/LC/P**
LO6		
Student workload (in hours)		**No. of hours**
Calculation	Lecture attendance	**30**
	Participation in classes, laboratory classes	**15**
	Participation in project classes	**15**
	Preparation for the test based on lecture content;	**16**

	Preparation for laboratory classes	**12**
	Preparation for passing the laboratory classes	**3**
	Participation for project assignments	**19**
	Completion of project assignments	**5**
	Preparation for passing project assignments	**6**
	Participation in consultations	**4**
	TOTAL:	**125**

Quantitative indicators	**HOURS**	**No. of ECTS credits**
Student workload – activities that require direct teacher participation	**66**	**2,6**
Student workload – practical activities	**77**	**3.1**

Basic references	1. T., Bondarouk, O. Lujan Smart Industry – Better Management, 2022 2. W. Kaczmarek, Y. Panasiuk, Robotization of production processes, Wyd. PWN, 2019 3. V. Joshi, Industrial Auatomation, 2024 (e-book)	
Supplementary references	Schwab K., The fourth industrial revolution, Penguin Random House, London, 2017.	
Organisational unit conducting the course	**Department of Automation Technology**	**Date of issuing the programme**
Author of the programme	**Andrzej Koszewnik, D.Sc**	**26.02.2025**

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