

COURSE DESCRIPTION CARD

Białystok University of Technology Faculty of Mechanical Engineering									
Field of study	Erasmus							Degree level and programme type	Bachelor's degree
Specialisation/ diploma path	-							Study profile	academic
Course name	Automation and robotization of processes							Course code	
								Course type	
Forms and number of hours of educational activities	L	C	LC	P	SW	FW	S	Semester	winter
	30		15	15				No. of ECTS credits	5
Entry requirements	Automation, Programming of control systems, Introduction to robotics								
Course objectives	<p>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.</p>								
Course content	<p>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: Grafset, 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:</p>								

	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	Lecture: 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 Auatation, 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