SYLLABUS

Course description

Course code	Course	Programowanie robotów przemysłowych
ME/O/I/NST/B21		Robot programming
Language of instruction		English
Academic year		2025/2026
field of study:		Mechanical Engineering
field of specialisation:		All
Educational level		first-cycle studies
Education profile		General academic
Mode of study		Part-time studies
Semester(s)		7
Affiliation with a group of classes		B . Group of obligatory course core subject
Course status		Obligatory

Types of classes, instruction hours, ECTS credits	Types of classes	Number of instruction hours	Number of ECTS credits
	Lecture	8 [h]	4 ECTS
	Classes	[h]	
	Lab	15 [h]	

Linkage of the course	with the education profile	Related to the conducted scientific activity in the discipline to which the field of study is assigned	0 ECTS
	with qualifications	It is used to acquire engineering competences by the student	4 ECTS
	with science discipline	Mechanical engineering	4 ECTS

Form of teaching	Traditional – classes organized at the University /classes conducted using distance learning methods and techniques
Prerequisites	news from Programming lub updates from Programming
Department	Faculty of Mechanical Engineering
Coordinator	M.Sc. Eng. Kinga Skrzek
The website of the basic organizational unit	http://wm.uniwersytetradom.pl
E-mail address, phone number of the coordinator	k.skrzek@urad.edu.pl

LEARNING OUTCOMES, CURRICULUM CONTENT, TEACHING CLASSES, VERIFICATION OF LEARNING OUTCOMES

Learning Objective:	The aim of the course is to introduce students to the basics of industrial robot programming. Theoretical foundations are

	illustrated with examples and practical exercises using industrial robots and RobotStudio software.
Curriculum Content:	Lecture topics: Introduction to safety principles at an industrial robot workstation. Overview of the basics of industrial robot programming, including: hardware structure and controller software, principles of manual control and program execution, various methods of tool calibration, controller operating modes, manipulator calibration, kinematic singularities, and the consequences of manipulator movement near singular configurations. Principles of proper task planning for robotic manipulators. Interaction with external devices through input/output signal exchange. Operation of robots sharing the workspace, principles of zone locking. Presentation of sample production programs. Laboratory exercises: Programming the robot using a Teach Pendant, offline programming, and point-to-point guidance. Manual control of an industrial robot in different coordinate systems. Tool and robot calibration. Saving and running programs. Interaction with external devices. Analysis of movement using approximate positioning. Programming of pick and place operations. Robot programming using RobotStudio and dedicated software. Task planning based on a geometric model of the object. Programming signal exchange. Generating a production program.
Didactic (educational) methods:	Informative lecture using audiovisual aids, laboratory exercises: individual work using RobotStudio software.
Course assessment type, the criteria for assessing the achieved learning outcomes, and the method of calculating the final grade:	The condition for passing the course is achieving all the required learning outcomes specified for the subject. Lecture – written assessment, Laboratory – average grade from exercise reports (50%).

Learning outcomes for the course in relation to the field of study learning outcomes and the type of classes				Methods of verifying learning outcomes	
Learning outcome number	Description of the learning outcomes for the course (PEU) A student who has passed the course (**W**) knows and understands / (**U**) can / (**K**) is ready to:	Field of study learning outcome (KEU)	Types of classes	Form of verification (credits)	Methods of testing and assessment
W1	knows and understands the basics of industrial robot programming and controller structure	K_WG08	Lecture	Written test	Written assessment
W2	knows the safety	K_WG19	Lecture	Written test	Written assessment

	principles for working with industrial robots				
U1	can program an industrial robot using teach pendant, offline methods, and RobotStudio software	K_UW02	Laboratory	Reports	Evaluation of reports
U2	can perform robot and tool calibration and establish communication with external devices via I/O signals	K_UW05	Laboratory	Reports	Practical task evaluation
K1	is ready to comply with safety regulations and work responsibly in a team	K_KK01	Laboratory	Continuous assessment	Teacher observation and feedback
K2	is ready to take responsibility for the implementation of assigned robot programming tasks	K_KK02	Laboratory	Continuous assessment	Engagement evaluation

Literature and teaching aids
Primary literature: • Craig, J. J. *Introduction to Robotics: Mechanics and Control*. Pearson Education. • Spong, M. W., Hutchinson, S., Vidyasagar, M. *Robot Modeling and Control*. Wiley. • ABB. *RobotStudio – User Manual and Tutorials*. ABB Robotics. Additional literature: • Siciliano, B., Khatib, O. (Eds.). *Springer Handbook of Robotics*. Springer. • Groover, M. P. *Automation, Production Systems, and Computer-Integrated Manufacturing*. Pearson. • Niku, S. B. *Introduction to Robotics: Analysis, Control, Applications*. Wiley. Study aids: • Manufacturer-provided software and simulation environments (e.g., ABB RobotStudio) • Instructional videos and tutorials on RobotStudio programming • Laboratory instructions and handouts provided by the instructor • Access to online learning platforms with robotics modules (e.g., Coursera, edX, MIT OpenCourseWare)

Student workload required to achieve the assumed learning outcomes – the balance of ECTS credits		
Attendance, participation	Student workload [h].	
	Student's self-study hours Classes without a teacher (ZBN**)**	Classes
Participation in lectures/classes/lab	X	8[h]/15[h]

Meeting with teachers during their duty hours	77 [h]	X
Preparation for lectures/classes/lab ,	77 [h]/ 3,1ECTS	23 [h]/ 0,9ECTS
Total student workload	4 ECTS	

Additional information, comments
In the case of students with special needs, including disabilities, and chronic illnesses, the methods and forms of verification of learning outcomes specified above (in the syllabus) are adapted to the individual needs of these students, as appropriate. Detailed rules and forms of support for students with special needs, including those with disabilities and chronically ill, during classes, credits, and exams are specified in: University Regulations (Regulamin Studiów Uniwersytetu Technologiczno-Humanistycznego w Radomiu), Study Regulations (Zasady Studiowania), and Procedure for Ensuring Accessibility of the Educational Process to Students with Special Needs, Including Those with Disabilities and Chronically ill (Procedura dotycząca zapewnienia dostępności procesu kształcenia studentom ze szczególnymi potrzebami, w tym: z niepełnosprawnością, przewlekle chorych).