



## Subject card

Subject name and code	Basics of Robotics - laboratory, PG_00047592						
Field of study	Automatic Control, Cybernetics and Robotics						
Date of commencement of studies	October 2021		Academic year of realisation of subject		2023/2024		
Education level	first-cycle studies		Subject group		Obligatory subject group in the field of study Subject group related to scientific research in the field of study		
Mode of study	Full-time studies		Mode of delivery		at the university		
Year of study	3		Language of instruction		Polish		
Semester of study	5		ECTS credits		1.0		
Learning profile	general academic profile		Assessment form		assessment		
Conducting unit	Department of Automatic Control -> Faculty of Electronics, Telecommunications and Informatics						
Name and surname of lecturer (lecturers)	Subject supervisor		dr inż. Piotr Fiertek				
	Teachers		dr inż. Marek Tatara dr inż. Piotr Fiertek				
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	0.0	0.0	15.0	0.0	0.0	15
	E-learning hours included: 0.0						
Learning activity and number of study hours	Learning activity	Participation in didactic classes included in study plan		Participation in consultation hours		Self-study	SUM
	Number of study hours	15		1.0		9.0	25
Subject objectives	Students do exercises related to issues described during the lecture: programming of industrial robots from Kawasaki (FA06E, RS03N) and Mitsubishi (RV-12SDL), getting acquainted with image processing algorithms.						
Learning outcomes	Course outcome		Subject outcome		Method of verification		
	[K6_U04] can apply knowledge of programming methods and techniques as well as select and apply appropriate programming methods and tools in computer software development or programming devices or controllers using microprocessors or programmable elements or systems specific to the field of study		The student got acquainted with the simulation environments and robot programming techniques of Kawasaki and Mitsubishi. The student learned to program robots from Kawasaki and Mitsubishi. The student learned the basic techniques of image processing. The student familiarized himself with the methodology of calibration of industrial robots. The student got acquainted with the method of robot communication with external devices.		[SU1] Assessment of task fulfilment		
	[K6_U05] can plan and conduct experiments related to the field of study, including computer simulations and measurements; interpret obtained results and draw conclusions		The student is able to conduct research and experiment in a simulation environment. He draws conclusions from the obtained results, repeats experiments until an acceptable result is obtained.		[SU1] Assessment of task fulfilment		

Subject contents	Laboratory exercises are a practical illustration of the issues presented in the lecture.  1. Learning of the simulation environment for Kawasaki robots - K-Roset.  2. Learning of the simulation environment for Mitsubishi robots - RT Toolbox2.  3. Implementation of a selected task in the field of image processing based on the Adaptive Vision Studio Lite program by Future Processing Sp. with o ...  4. Calibration of the robot at the station equipped with the Kawasaki RS03N robot. Drawing drawing by a robot.  5. Cooperation with the environment - at the station equipped with Kawasaki FA06E robot and the model of the conveyor line. The task of moving blocks.  6. Mitsubishi robot station - implementation of tasks related to moving the blocks.		
Prerequisites and co-requisites	The Denavit-Hartenberg"s notation.		
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Practical exercises, all tasks must be completed at a minimum of 50%	50.0%	100.0%
Recommended reading	Basic literature	1. Fiertek P., Tatara M.: Podstawy Robotyki - Laboratorium. Skrypt Politechniki Gdańskiej: 2017.  2. Craig J.: Wprowadzenie do robotyki. Mechanika i sterowanie. Wydawnictwo Naukowo-Techniczne. Warszawa: 1993.  3. Spong. M. W., Vidyasagar M.: Dynamika i sterowanie robotów. Wydawnictwa Naukowo-Techniczne. Warszawa: 1997.	
	Supplementary literature	1. Morecki A., Knapczyk. J.: Podstawy robotyki. Teoria i elementy manipulatorów i robotów. Wydawnictwa Naukowo-Techniczne. Warszawa: 1999.  2. Honczarenko J.: Roboty przemysłowe. Budowa i zastosowanie. Wydawnictwa Naukowo-Techniczne. Warszawa: 2004.	
	eResources addresses	Adresy na platformie eNauczanie: Podstawy robotyki - laboratorium - 2023/24 - Moodle ID: 32655 <a href="https://enauczanie.pg.edu.pl/moodle/course/view.php?id=32655">https://enauczanie.pg.edu.pl/moodle/course/view.php?id=32655</a>	
Example issues/ example questions/ tasks being completed	Programming a robot moving blocks in accordance with the task imposed by the teacher (changing the order of blocks, tower setting, etc.), drawing a drawing on a piece of paper using a robot equipped with a pen, developing an image processing algorithm to perform the task - eg reading the hour in the image showing the picture of the clock, searching for objects that meet the given criteria (size, shape, etc.).		
Work placement	Not applicable		