



Subject card

Subject name and code	Robotocs, PG_00057371						
Field of study	Mechanical Engineering						
Date of commencement of studies	February 2023		Academic year of realisation of subject		2022/2023		
Education level	second-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	1		Language of instruction		Polish		
Semester of study	1		ECTS credits		2.0		
Learning profile	general academic profile		Assessment form		assessment		
Conducting unit	Institute of Mechanics and Machine Design -> Faculty of Mechanical Engineering and Ship Technology						
Name and surname of lecturer (lecturers)	Subject supervisor		dr inż. Michał Mazur				
	Teachers		dr inż. Michał Mazur dr inż. Yurii Tsybrii				
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	15.0	0.0	15.0	0.0	0.0	30
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	30		4.0		16.0	50
Subject objectives	Expanding knowledge about robots and manipulators. Some specific issues relating to the actors, sensors and control systems.						
Learning outcomes	Course outcome		Subject outcome		Method of verification		
	[K7_W05] possesses profound knowledge on the operation of complex systems and mechanical devices, including process equipment		Students know how robots work.		[SW3] Assessment of knowledge contained in written work and projects		
	[K7_W06] possesses organized, profound knowledge necessary for designing and optimization of complex technological processes, modelling and calculations using numerical methods, knows modern manufacturing methods and tools for designing manufacturing processes of machines, devices, their elements and components		Students have theoretically founded knowledge related to the field of robots.		[SW3] Assessment of knowledge contained in written work and projects		
	[K7_U05] is able to plan and conduct the experimental research determining the parameters of a device or system, assesses the usability and correctly selects methods and tools, is able to interpret the results and estimate the measurement errors and is able to apply computer systems to simulate the operation of a machine or technology		Students analyze the knowledge contained in scientific publications in order to solve the problems posed to them.		[SU2] Assessment of ability to analyse information		

Subject contents	<p>LECTURE: 1 Introduction 2 Modern trends in the development of two industrial robots 3 Sensors 4 Signal Conditioning 5 Tactile and haptic sensors 6 Methods of localization of mobile robots 7 Effectors 8 Elements of power supply systems 9 Drive chain elements used in robots 10 Tools for robot programming and simulation</p> <p>Laboratory: 1 Programming a movement of an industrial robot 2 Bioloid 3 LEGO NXT</p>											
Prerequisites and co-requisites	Basics of mathematics, mechanics and automation, the ability to program engineering calculations.											
Assessment methods and criteria	<table border="1" data-bbox="448 367 1497 472"> <thead> <tr> <th data-bbox="448 367 798 405">Subject passing criteria</th> <th data-bbox="802 367 1141 405">Passing threshold</th> <th data-bbox="1145 367 1497 405">Percentage of the final grade</th> </tr> </thead> <tbody> <tr> <td data-bbox="448 412 798 439">Team projects</td> <td data-bbox="802 412 1141 439">50.0%</td> <td data-bbox="1145 412 1497 439">40.0%</td> </tr> <tr> <td data-bbox="448 445 798 472">Midterm colloquium</td> <td data-bbox="802 445 1141 472">50.0%</td> <td data-bbox="1145 445 1497 472">60.0%</td> </tr> </tbody> </table>			Subject passing criteria	Passing threshold	Percentage of the final grade	Team projects	50.0%	40.0%	Midterm colloquium	50.0%	60.0%
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Example issues/ example questions/ tasks being completed	<p>What is a sensor? Advantages and disadvantages of digital sensors? Advantages and disadvantages of analog sensors? Discuss conditioning. Haptic systems. Robots development trends. Advantages and disadvantages of ultrasonic sensors for distance measurement. List the location methods. Techniques for measuring distance. Advantages and disadvantages of monolithic architecture. Advantages and disadvantages of distributed architecture. Robust programming - fault detection techniques. Application of real-time systems in robot control. What is SLAM? What do we use quaternions for? Discuss Spherical Linear Interpolation Applications of dual quaternions. What is ROS? Discuss MoveIT Discuss 2D Navigation in a ROS environment Discuss the control of the quadcopter What is Zero Moment Point?</p>											
Work placement	Not applicable											