



## Subject card

Subject name and code	Automation and robotics II, PG_00023323						
Field of study	Medical and Mechanical Engineering, Mechanical and Medical Engineering						
Date of commencement of studies	October 2020		Academic year of realisation of subject		2021/2022		
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	2		Language of instruction		Polish		
Semester of study	4		ECTS credits		3.0		
Learning profile	general academic profile		Assessment form		exam		
Conducting unit	Department of Mechanics and Mechatronics -> Faculty of Mechanical Engineering and Ship Technology						
Name and surname of lecturer (lecturers)	Subject supervisor		dr inż. Wiktor Sieklicki				
	Teachers		dr inż. Wiktor Sieklicki				
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						
	Adresy na platformie eNauczanie:						
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		5.0		40.0	75
Subject objectives	widen knowledge about robots, their classification, design and application. Define sensors and control systems						
Learning outcomes	Course outcome		Subject outcome		Method of verification		
	K6_U07		Student has knowledge about devices used in medicine and some basic information about design of those devices		[SU1] Assessment of task fulfilment [SU4] Assessment of ability to use methods and tools		
	K6_U05		Student is able to design and analyze basic control systems in automatics		[SU2] Assessment of ability to analyse information		
	K6_U04		Student is able to program simple control systems		[SU1] Assessment of task fulfilment [SU2] Assessment of ability to analyse information [SU4] Assessment of ability to use methods and tools		
	K6_W06		Student has knowledge of sub-systems used in robotics and knows the design of basic robotic manipulators		[SW2] Assessment of knowledge contained in presentation		
Subject contents	Introduction to robotics, design of robots and manipulators, control systems for robots. Actuators in medical devices. Kinematics of manipulators. d-h notation. inverse and simple kinematics. Sensors in medical robots. Programming of simple robots. Surgery robots. Virtual reality in medical robots. Diagnostics robots. Endoscopy robots.  -manipulator design\  -programming of simple robotic systems						

Prerequisites and co-requisites	mathematics, physics, mechanics, strength of the materials, machine design, biomechanics, informatics		
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
		56.0%	25.0%
		56.0%	75.0%
Recommended reading	Basic literature	Craig J., J., Wprowadzenie do robotyki. Mechanika i sterowanie, WNT, Warszawa 1993Jazar Reza, Theory of Applied Robotics, Kinematics, Dynamics and Control, Springer Press, 2010Giralt G., Hirzinger G., Robotic Research, Springer Press, 1996Honczarenko J., Roboty przemysłowe. Budowa i zastosowanie, WNT, Warszawa 2002Bishop R.,TheMechatronics Handbook. CRC Press 2002Siciliano B., Khatib O.: Springer Handbook of Robotics. Berlin: Springer 2008Morecki A., Knapczyk J., Kędzior K., Teoria mechanizmów i manipulatorów, WNT, Warszawa 2002Jarzębowska E.: Mechanika analityczna. Warszawa: Oficyna Wydawnicza Politechniki Warszawskiej 2003K. Kozłowski, P. Dutkiewicz, W. Wróblewskim, Modelowanie i sterowanie robotów. PWN Warszawa, 2003Węgrzyn S.: Podstawy automatyki. PWN Warszawa, 1978,	
	Supplementary literature	Holejko D., Kościelny W.J.: Automatyka procesów ciągłych, Oficyna Wydawnicza Politechniki Warszawskiej, 2012,Żelazny M.: Podstawy automatyki, Państwowe Wydawnictwo Naukowe, 1976,Perycz S.: Podstawy automatyki. Skrypt PG, Gdańsk 1983,Jarzębowska E., Podstawy dynamiki mechanizmów i manipulatorów, OficynaWydawnicza Politechniki Warszawskiej, Warszawa 1998Arkin R., Behavior-Bassed Robotics. MIT Press, 1998	
		eResources addresses	
Example issues/ example questions/ tasks being completed	Describe robots and characterize them based on: power source, design, control algorithm, redundancy, kinematics, etc.  Give examples of robots used in medicine, military, home appliances, and describe them.  What are: AGV, UAV, adaptive control, redundancy, type of workspace, planar mechanism, joint types, manipulator mobility, translational planar mechanisms, inverse and simple kinematics, d-h definition, matrices:rotation, transformation, displacement.		
Work placement	Not applicable		