



## Subject card

Subject name and code	Robotic manipulators, PG_00053663						
Field of study	Mechanical Engineering, Mechanical Engineering						
Date of commencement of studies	October 2020	Academic year of realisation of subject			2022/2023		
Education level	first-cycle studies	Subject group					
Mode of study	Full-time studies	Mode of delivery			at the university		
Year of study	3	Language of instruction			English		
Semester of study	6	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. 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	0.0	0.0	30.0	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	0.0		0.0	30	
Subject objectives	Provide knowledge about manipulators, their classification, design and applications.						
Learning outcomes	Course outcome	Subject outcome			Method of verification		
	K6_U01	Student is able to design simple subsystems of manipulators			[SU2] Assessment of ability to analyse information [SU4] Assessment of ability to use methods and tools		
	K6_U07	Student has a knowledge about subsystems utilized in robotics and understands their composition and design.			[SU1] Assessment of task fulfilment [SU4] Assessment of ability to use methods and tools		
	K6_W12	Student is able to program simple control units of robots and understands the design of the programs used in controlling manipulators.			[SW2] Assessment of knowledge contained in presentation		
	K6_W06	Student has the knowledge of chosen manipulators design			[SW1] Assessment of factual knowledge [SW2] Assessment of knowledge contained in presentation		
Subject contents	Introduction to robotics, robots and manipulators design. End-effectors classification. End-effectors in industry application. Kinematics and dynamics of serial manipulators. Denavit-Hartenberg notation. Forward and Inverse kinematics.						
Prerequisites and co-requisites	basic knowledge in: 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%			100.0%		
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. Wróblewski, 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, Oficyna Wydawnicza Politechniki Warszawskiej, Warszawa 1998 Arkin R., Behavior-Based Robotics. MIT Press, 1998
Example issues/ example questions/ tasks being completed	eResources addresses	1. Create control program for an industrial manipulator in point-to-point system  2. Build a small mobile robot
Work placement		Not applicable