



Subject card

Subject name and code	Computer Design of Manipulators and Robots, PG_00038126						
Field of study	Automation, Robotics and Control Systems						
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				Polish	
Semester of study	6	ECTS credits				3.0	
Learning profile	general academic profile	Assessment form				assessment	
Conducting unit	Katedra Biomechatroniki -> Faculty of Electrical and Control Engineering						
Name and surname of lecturer (lecturers)	Subject supervisor		dr inż. Mariusz Dąbkowski				
	Teachers		dr inż. Mariusz Dąbkowski				
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	15.0	0.0	0.0	30.0	0.0	45
	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	45		4.0		26.0	75
Subject objectives	The aim of the course is to show students, how to realize the designing process of mechatronic devices and to teach them how to do it in practice during designing robot's manipulator.						
Learning outcomes	Course outcome		Subject outcome		Method of verification		
	K6_K02		Student is able to work in a group in order to solve a given technical problem and he develops "soft" skills.		[SK3] Assessment of ability to organize work [SK4] Assessment of communication skills, including language correctness [SK1] Assessment of group work skills [SK2] Assessment of progress of work		
	K6_U08		Student uses catalogs (paper and on-line) of devices needed to build an industrial robot (structural elements, bolts, nuts, motors, gears, wires, etc.).		[SU1] Assessment of task fulfilment [SU2] Assessment of ability to analyse information [SU3] Assessment of ability to use knowledge gained from the subject [SU4] Assessment of ability to use methods and tools		
	K6_W10		Student lists the basic stages of designing stationary robots. He characterizes the individual phases of the design process. Performs calculations for the task of simple and inverse kinematics for the selected scheme with 3-degrees of freedom.		[SW1] Assessment of factual knowledge		
Subject contents	Lecture: Reminder of basic knowledge about technical drawing. Basic issues concerning the design of robots: the design methodology (formulation of the design's task, preparation of conceptual design, preparation of constructional design, preparation of the project of realization), creating the concept of manipulator (the task of designing, drawing up a list of requirements, the synthesis of kinematic structure of manipulator, the initial calculation of kinematics and dynamics), calculations of the construction (industrial robot functional structure, mechanisms of orienting, manipulator carrier system, propelling manipulator, grippers and their accuracy of positioning). Project: Design of the robot stationary supporting structure to carry out defined task, including: a description of the kinematics and dynamics, the basic calculation of design and construction of the mechanical system, the choice of drives and technical documentation with drawings. Design of the hardware part of the CNC system of the robot.						
Prerequisites and co-requisites	A fluent using of AutoCad environment. Knowledge of the structure of the CNC system.						

Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Test	50.0%	25.0%
	Project	100.0%	75.0%
Recommended reading	Basic literature	<ol style="list-style-type: none"> 1. Spong. M. W., Vidyasagar M.: Dynamika i sterowanie robotów. Wydawnictwa Naukowo-Techniczne. Warszawa: 1997. 2. Morecki A, Knapczyk J.: Podstawy robotyki. Warszawa: WNT 1999. 3. Niederliński A.: Roboty przemysłowe. Warszawa: WSiP 1981. 4. Honczarenko J.: Roboty przemysłowe. Budowa i zastosowanie. WNT Warszawa, 2004. 5. Dobrzański T.: Rysunek techniczny maszynowy. Wydawnictwa Naukowo-Techniczne. Warszawa: 2021. 	
	Supplementary literature	<ol style="list-style-type: none"> 1. Morecki A., Knapczyk. J.: Podstawy robotyki. Teoria i elementy manipulatorów i robotów. Wydawnictwa Naukowo-Techniczne. Warszawa: 1999. 2. Tomaszewski K. : Roboty przemysłowe. Projektowanie układów mechanicznych. Wydawnictwa Naukowo-Techniczne. Warszawa: 1993. 	
	eResources addresses		
Example issues/ example questions/ tasks being completed	<ol style="list-style-type: none"> 1. principles of design process (task definition, preparation of conceptual project, preparation of constructional project, preparation of the executive project), 2. development of the concept of the manipulator (task design, a list of requirements, the synthesis of the kinematic structure of the manipulator, kinematic and dynamic calculations), 3. structural calculations: static and dynamic - choosing the drives. 		
Work placement	Not applicable		