



Subject card

Subject name and code	, PG_00056123						
Field of study	Mechatronics						
Date of commencement of studies	October 2022		Academic year of realisation of subject		2024/2025		
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		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 hab. inż. Ryszard Jasiński				
	Teachers						
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		0.0		0.0	30
Subject objectives	To acquaint students with the structure and principle of operation of mechatronic devices in medicine						
Learning outcomes	Course outcome		Subject outcome		Method of verification		
	[K6_W08] knows and understands design and production processes of elements and simple mechatronic devices		Student understands the processes of designing and manufacturing elements and simple mechatronic devices used in medicine.		[SW3] Assessment of knowledge contained in written work and projects [SW2] Assessment of knowledge contained in presentation		
	[K6_W10] has a basic knowledge about development trends in terms of engineering and technical sciences and scientific disciplines: Mechanical Engineering, Automation, Electronics and Electrical Engineering, adequate for Mechatronics curse		Student has a basic knowledge of development trends in the field technical sciences and scientific disciplines: Mechanical Engineering and Automation, Electronics and Electrical Engineering, appropriate for the field of Mechatronics studies. Student explains the structure and principle of operation of mechatronic devices in medicine.		[SW3] Assessment of knowledge contained in written work and projects		
	[K6_U05] is able to use properly choosen tools to compare design solutions of elements and mechatronics systems according to given application and economic crierions (e.g. power demand, speed, costs)		Student is able to use properly selected tools in the basic scope in order to compare the design solutions of mechatronic elements and systems used in medicine, due to the set operational and economic criteria.		[SU1] Assessment of task fulfilment		
	[K6_U06] is able to identify and formulate specification of simple, practical engineering tasks, distinctive for mechatronics		Student is able to identify and formulate the specification of simple engineering tasks of a practical nature, characteristic of mechatronic devices used in medicine.		[SU2] Assessment of ability to analyse information		

Subject contents	Construction and operation of respirators. Transport devices (transport trolleys, stair climbers, transport vehicles).Upper limb and torso braces. Finger, upper and lower limb prostheses. Designing a bionic arm (pneumatic muscles, equation of motion, kinematic diagram). Units (elements and equipment, pneumatic diagrams). Dental compressors.Devices for supporting blood circulation (human heart, cardiovascular support, counterpulsation methods, peristaltic pumps, artificial hearts). Kidney dialysis devices (kidney function, hemodialysis, artificial kidney functional system, semi-permeable membrane, peritoneal dialysis). Construction and operation of endoscopes. X-ray machine (construction of the X-ray apparatus, power supply system, construction of the X-ray tube, X-ray machines). Medical robots (classification of medical robots, assistant robots, precise positioning and displacement systems, manipulators and diagnostic cameras).Surgical robots (telemanipulators, ZEUS and Robin Heart surgical robots, surgical materials and tools). Urology robot (construction of the MrBot robot, construction and control of the PneuStep motor).		
Prerequisites and co-requisites	Basics of automations Basics of hydraulics and pneumatics Components of mechatronic systems		
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Laboratory	56.0%	50.0%
	Midterm colloquium	56.0%	50.0%
Recommended reading	Basic literature	Heiman B., Gerth W., Popp K.: Mechatronika, metody, przykłady, tł. Gawrysiak M., Wydawnictwo Naukowe PWN, Warszawa, 2001 Gawrysiak M.: Mechatronika i projektowanie mechatroniczne, Rozprawy Naukowe Nr 44, Polit. Białostocka, Białystok, 1997 Schmid D. i inni: Mechatronika, ISBN 83-7141-425-0, Warszawa 2002 Praca zbiorowa: Urządzenia i systemy mechatroniczne. Cz.2, Wydawnictwo REA, 2009 Dindorf R., Wołkow J.: Systemy płynowe w inżynierii medycznej. Zakład Narodowy im Ossolińskich. Wrocław Warszawa Kraków. 1999. Pawlicki G.: Podstawy inżynierii medycznej. Oficyna Wydawnicza Politechniki Warszawskiej. Warszawa 1997. Podsędkowski L.: Roboty medyczne. Budowa i zastosowanie. WNT Warszawa 2010.	
	Supplementary literature	No requirements	
	eResources addresses	Adresy na platformie eNauczanie:	
Example issues/ example questions/ tasks being completed	-		
Work placement	Not applicable		

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