GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	, PG_00056123		
Field of study	Mechatronics		
Date of commencement of studies	October 2023	Academic year of realisation of subject	2025/2026
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_W10] has knowledge about development trends in the field of engineering and technology sciences and scientific disciplines: Mechanical Engineering, Automation, Electronics, Electrical Engineering and Space Technologies, 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 chosen tools to compare design solutions of elements and mechatronics systems according to given application and economic criteria (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
[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.	[SW2] Assessment of knowledge contained in presentation [SW3] Assessment of knowledge contained in written work and projects

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
Midterm colloquium	56.0%	50.0%
Laboratory	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	