GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Hydraulics and pneumatics in medicine, PG_00055751		
Field of study	Mechanical and Medical Engineering		
Date of commencement of studies	October 2022	Academic year of realisation of subject	2023/2024
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	3	ECTS credits	2.0
Learning profile	general academic profile	Assessment form	assessment
Conducting unit	Department of Mechanics and Mechatronics -> Faculty of Mechanical Engineering and Ship Technology		
Name and surname of lecturer (lecturers)	Subject supervisor	dr hab. inż. Paweł Śliwiński	
	Teachers	dr hab. inż. Paweł Śliwiński	

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	2.0	18.0	50

Subject objectives

Knowlege of physical phenomena, principles of design and operation of hydraulic and pneumatic drive and control systems

Learning outcomes

Course outcome	Subject outcome	Method of verification
[K6_W07] he/she is able to design, manufacture and utilize machine parts and technical devices, he/she can prepare a technical documentation		[SW1] Assessment of factual knowledge
[K6_U05] he/she is able to use analytic and modelling methods to formulate and solve engineering tasks related to the mechanical-medical area		[SU3] Assessment of ability to use knowledge gained from the subject
[K6_U07] he/she is able to identify the problem and list simple engineering tasks to solve this problem in practice, he/she is able to critically analyze the proposed technical solutions and conclude whether these solutions can be implemented to solve problems related to design of mechanical devices and mechanical-medical devices		[SU2] Assessment of ability to analyse information [SU3] Assessment of ability to use knowledge gained from the subject

Subject contents	1. Viscosity, laminar and turbulent flow, Bernouli law, the Reynolds number. 2. Flow in pipes, and in throttle elements. 3. Construction and operation of hydraulic and pneumatic components - pumps, motors and valves. 4. Basic parameters of pumps and hydraulic motors. Losses and efficiency. 5. Hydraulic system with throttle valve. 6. Volumetric systems.
Prerequisites and co-requisites	Physics

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
laboratory	56.0%	35.0%
test after lecture	56.0%	65.0%

Recommended reading

Basic literature	1. Osiecki A.: Hydrostatyczny napęd maszyn. WNT, Warszawa 1998 2. Szejnach W.: Napęd i sterowanie pneumatyczne. WNT, Warszawa 1997 3. Balawender A. et al: Laboratorium napędów hydraulicznych. Część 1. Podstawy hydrauliki. Gdańsk 1996 4. Niegoda J., Pomierski W.: Sterowanie pneumatyczne. Ćwiczenia laboratoryjne. Skrypt PG, Gdańsk 1998
Supplementary literature	1. Dindorf R.: Napędy płynowe. Podstawy teoretyczne i metody obliczania napędów hydraulicznych i pneumatycznych.Wydawnictwo Politechniki Świętokrzyskiej. Kielce 2009
eResources addresses	Adresy na platformie eNauczanie: Hydraulika i pneumatyka w medycynie - Nowy kopiuj 1 - Moodle ID: 29393 https://enauczanie.pg.edu.pl/moodle/course/view.php?id=29393

Example issues/ example questions/ tasks being completed	1. Influence of liquid parameters on flow phenomena in pipes and throttling elements. 2. Influence of the parameters of the pipe and throttling element (elbow, valve, etc.) on the pressure drop. 3. Is the pressure drop in the pipe or any part of the system desirable or not and why? 4. Throttle speed control of the hydraulic motor. What does engine speed depend on? Pump operating pressure and motor port pressure. 5. Volumetric speed control of the hydraulic motor. What does engine speed depend on? Pump operating pressure and motor port pressure. 6. Draw a pneumatic system with two cylinders A and B, where cylinder A is single-acting and B is double-acting. Both actuators start moving simultaneously after pressing the START button and both return simultaneously when they both take the extreme extended position.
Work placement	Not applicable