



## Subject card

Subject name and code	Hydraulics and Pneumatics, PG_00040066						
Field of study	Mechanical Engineering						
Date of commencement of studies	October 2021		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	Part-time studies		Mode of delivery		at the university		
Year of study	3		Language of instruction		Polish		
Semester of study	5		ECTS credits		3.0		
Learning profile	general academic profile		Assessment form		exam		
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		5.0		40.0	75
Subject objectives	Knowledge 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_W08] possesses basic knowledge including the methodology of designing machine parts, mechanical devices, selection of construction materials, manufacturing and operation, with the lifetime cycle		Knows the basics of hydrostatic and pneumatic drives		[SW1] Assessment of factual knowledge		
	[K6_U07] is able to design a typical construction of a mechanical device, component or a testing station using appropriate methods and tools, adhering to the set usage criteria		Knows the basics of hydrostatic and pneumatic drives		[SU4] Assessment of ability to use methods and tools [SU3] Assessment of ability to use knowledge gained from the subject [SU2] Assessment of ability to analyse information [SU1] Assessment of task fulfilment		
Subject contents	LECTURE: Hydraulic and pneumatic drive and control structure. Properties of liquids and air. Pressure losses in the installation and their calculation. Flows in cracks. Basic hydraulic and pneumatic elements: pumps, motors, actuators, valves, filters, accumulators, compressed air units. Basic hydrostatic and pneumatic systems.  LABORATORIES: Practical familiarization with the construction and operation of hydraulic and pneumatic elements, self-assembly of basic systems, experimental determination of the characteristics of hydraulic elements.						
Prerequisites and co-requisites	Physics						

Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	laboratory	56.0%	35.0%
	exam	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  2. Stryczek S.: Napęd hydrostatyczny. PWN, Warszawa 2016	
	eResources addresses	Adresy na platformie eNauczanie: Hydraulika i Pneumatyka, MiBM, I st., studia niest., sem. 5, zimowy 2023/2024 - Moodle ID: 33562 <a href="https://enauczanie.pg.edu.pl/moodle/course/view.php?id=33562">https://enauczanie.pg.edu.pl/moodle/course/view.php?id=33562</a>	
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. Describe the flow through a flat slit, basic relationships 5. Throttle speed control of the hydraulic motor. What does engine speed depend on? Pump operating pressure and motor port pressure. 6. Volumetric speed control of the hydraulic motor. What does engine speed depend on? Pump operating pressure and motor port pressure. 7. 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		