



Subject card

Subject name and code	, PG_00062009						
Field of study	Mechanical and Naval Engineering						
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	Part-time studies	Mode of delivery			at the university		
Year of study	3	Language of instruction			Polish		
Semester of study	5	ECTS credits			8.0		
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						
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	36.0	0.0	9.0	18.0	0.0	63
	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	63	0.0		0.0	63	
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_U14] is able to analyse the operation of devices and compare the construction solutions applying usage, safety, environmental, economic and legal criteria	The student is able to analyse the operation of basic hydraulic and pneumatic systems and compare various basic systems.			[SU2] Assessment of ability to analyse information [SU4] Assessment of ability to use methods and tools		
	[K6_W11] has knowledge of analysis, design, technology and manufacturing of selected technical systems, machinery and equipment, metrology and quality control, knows and understands methods of measurement and calculation of basic quantities describing the operation of technical systems, knows basic calculation methods used to analyse experimental results	Student has knowledge of the design of basic hydraulic and pneumatic systems.			[SW1] Assessment of factual knowledge		
	[K6_W08] has a knowledge of the analysis and design of selected technical systems, machines and technical equipment, selection of construction materials, manufacturing and operation, including their life cycle	Student is able to analyse basic hydraulic and pneumatic systems.			[SW1] Assessment of factual knowledge		
	[K6_U03] is able to identify, formulate and develop the documentation of a simple design or technological task, including the description of the results of this task in Polish or in a foreign language and to present the results using computer software or other aiding tools	Student is able to identify and formulate specifications for simple practical engineering tasks and critically analyse existing technical solutions and evaluate the functioning of basic hydraulic and pneumatic systems.			[SU1] Assessment of task fulfilment [SU2] Assessment of ability to analyse information [SU3] Assessment of ability to use knowledge gained from the subject		

Subject contents	<p>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.</p> <p>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.</p>		
Prerequisites and co-requisites	Physics		
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	exam	56.0%	65.0%
	laboratory	56.0%	35.0%
Recommended reading	Basic literature	<ol style="list-style-type: none"> <li>1. Osiecki A.: Hydrostatyczny napęd maszyn. WNT, Warszawa 1998</li> <li>2. Szejnach W.: Napęd i sterowanie pneumatyczne. WNT, Warszawa 1997</li> <li>3. Balawender A. et al: Laboratorium napędów hydraulicznych. Część 1. Podstawy hydrauliki. Gdańsk 1996</li> <li>4. Niegoda J., Pomierski W.: Sterowanie pneumatyczne. Ćwiczenia laboratoryjne. Skrypt PG, Gdańsk 1998</li> </ol>	
	Supplementary literature	<ol style="list-style-type: none"> <li>1. Dindorf R.: Napędy płynowe. Podstawy teoretyczne i metody obliczania napędów hydraulicznych i pneumatycznych. Wydawnictwo Politechniki Świętokrzyskiej. Kielce 2009</li> <li>2. Stryczek S.: Napęd hydrostatyczny. PWN, Warszawa 2016</li> </ol>	
	eResources addresses	Adresy na platformie eNauczanie:	
Example issues/ example questions/ tasks being completed	<ol style="list-style-type: none"> <li>1. Influence of liquid parameters on flow phenomena in pipes and throttling elements.</li> <li>2. Influence of the parameters of the pipe and throttling element (elbow, valve, etc.) on the pressure drop.</li> <li>3. Is the pressure drop in the pipe or any part of the system desirable or not and why?</li> <li>4. Describe the flow through a flat slit, basic relationships</li> <li>5. Throttle speed control of the hydraulic motor. What does engine speed depend on? Pump operating pressure and motor port pressure.</li> <li>6. Volumetric speed control of the hydraulic motor. What does engine speed depend on? Pump operating pressure and motor port pressure.</li> <li>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.</li> </ol>		
Work placement	Not applicable		

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