



## Subject card

Subject name and code	Hydraulics and pneumatics, PG_00055062						
Field of study	Management and Production Engineering						
Date of commencement of studies	October 2021	Academic year of realisation of subject				2022/2023	
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	4	ECTS credits				3.0	
Learning profile	general academic profile	Assessment form				exam	
Conducting unit	Zakład Hydrauliki i Pneumatyki -> Institute of Mechanics and Machine Design -> 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	30.0	0.0	15.0	0.0	0.0	45
	E-learning hours included: 0.0						
	Hydraulika i pneumatyka, ZiIP, sem. 4, PG_00055062 - Moodle ID: 29409 <a href="https://enauczanie.pg.edu.pl/moodle/course/view.php?id=29409">https://enauczanie.pg.edu.pl/moodle/course/view.php?id=29409</a>						
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	45	4.0		26.0	75	
Subject objectives	Acquainting with physical phenomena, the basics of design and operation of hydraulic and pneumatic drive and control systems						
Learning outcomes	Course outcome	Subject outcome			Method of verification		
	[K6_W04] has basic knowledge in the field of automation, robotics and control of production processes, has elementary knowledge of electrical and electronic applications in the production system, has basic knowledge of thermodynamics and fluid mechanics as well as the selection and design of hydraulic and pneumatic systems	Knows the basics of hydrostatic and pneumatic drives			[SW1] Assessment of factual knowledge		
	[K6_K01] feels the need for self-realization by learning throughout life, is looking for modern and innovative solutions in their actions, is able to think creatively and act in an entrepreneurial way	Knows the basics of hydrostatic and pneumatic drives			[SK3] Assessment of ability to organize work [SK5] Assessment of ability to solve problems that arise in practice [SK2] Assessment of progress of work		
	[K6_U02] has the ability of self-learning and expanding knowledge in a specialized field of engineering production	Knows the basics of hydrostatic and pneumatic drives			[SU2] Assessment of ability to analyse information [SU4] Assessment of ability to use methods and tools		

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
	Laboratory pass	56.0%	35.0%
	exam	56.0%	65.0%
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. i inni: 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		
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		