GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Hydraulics and Pneumatics, PG_00040191		
Field of study	Mechanical Engineering		
Date of commencement of studies	October 2024	Academic year of realisation of subject	2026/2027
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	3	Language of instruction	English none
Semester of study	5	ECTS credits	4.0
Learning profile	general academic profile	Assessment form	exam
Conducting unit	Division of Fluid-Flow Machinery -> Institute of Energy -> Faculty of Mechanical Engineering and Ship Technology -> Faculties of Gdańsk University of Technology		
Name and surname of lecturer (lecturers)	Subject supervisor	prof. dr hab. inż. Jerzy Głuch	
	Teachers	dr inż. Stanisław Głuch prof. dr hab. inż. Jerzy Głuch	

Lesson types

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

eNauczanie source addresses:

Moodle ID: 7899 Hydraulics and Pneumatics
https://enauczanie.pg.edu.pl/2025/course/view.php?id=7899

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	9.0	46.0	100

Subject objectives

Familiarization with physical phenomena and the fundamentals of the design and operation of hydraulic and pneumatic drive and control systems.

Learning outcomes

Course outcome	Subject outcome	Method of verification
K6_U07	The student is able to create a preliminary design of a hydraulic system.	[SU3] Assessment of ability to use knowledge gained from the subject [SU4] Assessment of ability to use methods and tools
K6_W08	The student is able to design a hydraulic device.	[SW3] Assessment of knowledge contained in written work and projects

<table>
<tr><td>Subject contents</td><td>Course content – lecture
LECTURE:

Structure of hydraulic and pneumatic drive and control systems. Properties of working fluids and air. Pressure losses in systems and their calculation. Flow through clearances. Basic components and systems (hydrostatic and pneumatic) in machinery: pumps, motors, actuators, valves, filters, accumulators, compressed air units. Basic calculations for hydraulic and pneumatic drive systems

Course content – laboratory
LABORATORY SESSIONS:

Practical familiarization with the construction and operation of hydraulic and pneumatic components, and independent assembly of basic cycles.</td></tr>
<tr><td>Prerequisites and co-requisites</td><td>Basic knowledge of physics</td></tr>
<tr><td>Assessment methods and criteria</td><td><table>
<tr><th>Subject passing criteria</th><th>Passing threshold</th><th>Percentage of the final grade</th></tr>
<tr><td>laboratory reports</td><td>100.0%</td><td>50.0%</td></tr>
<tr><td>lecture test</td><td>60.0%</td><td>50.0%</td></tr>
</table></td></tr>
<tr><td>Recommended reading</td><td><table>
<tr><td>Basic literature</td><td>J.A. Sullivan. Fluid Power Theory and Application.
J.E. Johnson. Hydraulics for Engineering Technology
A. Esposito. Fluid Power with Applications</td></tr>
<tr><td>Supplementary literature</td><td>R. Dindorf, P. Woś. Development of Hydraulic Power Systems</td></tr>
<tr><td>eResources addresses</td><td></td></tr>
</table></td></tr>
<tr><td>Example issues/ example questions/ tasks being completed</td><td>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 relationships5. Engine speed control using a throttle valve. What does engine speed depend on? Pump operating pressure and motor port pressure.
6. Motor speed control by changing the pump and/or motor displacement setpoint. 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 doubleacting. Both actuators start moving simultaneously after pressing the START button and both return simultaneously when they both take the extreme extended position</td></tr>
<tr><td>Practical activites within the subject</td><td>Not applicable</td></tr>
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