GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Mechatronics fluids , PG_00043689						
Field of study	Mechatronics						
Date of commencement of studies	February 2024		Academic year of realisation of subject	2024/2025			
Education level	second-cycle studies		Subject group				
Mode of study	Full-time studies		Mode of delivery	at the university			
Year of study	1		Language of instruction	Polish			
Semester of study	2		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						
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		0.0	0.0	30	
Subject objectives	The goal of the subject is to introduce basics of control and regulation of hydraulic cicuits to students. The main emphasis is put on machine systems in which the control process bases on fluid and electrical signals. Students will be introduced to the the basics of design of such systems and methods of modeling and simulation.						

Learning outcomes	Course outcome	Subject outcome	Method of verification
	[K7_W06] has detailed, supported by the theory knowledge in terms of mechatronic design, mechatronic systems and machines, devices and process where they are used	The student has detailed theoretical knowledge related to the issues of designing fluid systems of machines and devices.	[SW3] Assessment of knowledge contained in written work and projects [SW1] Assessment of factual knowledge
	[K7_W01] has extended knowledge in terms of selected areas of mathematics, including discrete and applied mathematics, optimisation methods, mathematical and numerical methods essential for: 1) modelling and analysis of nonstationary mechatronics, continuous and discrete time systems as well as physical phenomena; 2) description and analysis of mechatronic systems that include programmable devices 3) description and analysis of signal processing algorithms 4) synthesis of non-stationary mechatronic systems	The student is able to analyse and describe hydrostatic systems of machine drives. The student is able to identify physical phenomena accompanying the operation of fluid systems.	[SW3] Assessment of knowledge contained in written work and projects [SW1] Assessment of factual knowledge
	[K7_U04] is able to utilise known methods and mathematical models, as well as computer simulations for analysis and evaluation of non-stationary continuous and discrete mechatronic systems and processes	The student is able to use known methods and mathematical models of hydraulic elements, as well as computer simulations, to analyse and evaluate hydraulic systems.	[SU4] Assessment of ability to use methods and tools [SU2] Assessment of ability to analyse information
	[K7_W10] knows development trends and most important new achievements in technical sciences and science disciplines: Mechanical Engineering, Automation, Electronics and Electrical Engineering and related: Informatics and Materials Engineering	The student knows the development trends and the most important new achievements in the area of hydrostatic machine drives and controls.	[SW2] Assessment of knowledge contained in presentation
Subject contents	1. Open and closed hydraulic circuits, 2. Open-center and closed-center systems, 3. Regulators and safety systems of hydraulic pumps and motors, 4. Proportional and servo technology, 5. Control systems of vehicle drives, 6. Complex control systems used in working machines 7. Stability of systems with cylinders, 8. Mathematical basics of modeling fluid systems, 9. Modelling fluid systems using Festo Fluid-Sim and Matlab Simulink.		
Prerequisites and co-requisites	Basics of Hydraulics and Pneumatics Basics of Automatics		

<table>
<tr><td>Assessment methods and criteria</td><td colspan="2"><table>
<tr><th>Subject passing criteria</th><th>Passing threshold</th><th>Percentage of the final grade</th></tr>
<tr><td>Laboratory exercises raport</td><td>56.0%</td><td>1.0%</td></tr>
<tr><td>Final test</td><td>56.0%</td><td>99.0%</td></tr>
</table></td></tr>
<tr><td rowspan="3">Recommended reading</td><td>Basic literature</td><td>Andrzej Osiecki - Hydrauliczny napęd maszyn

Group work- Hydraulics Trainer Volume 1, Basic principles and components of fluid technology

Group work- Hydraulics Trainer Volume 2, Proportional and servo technology

Group work- Hydraulics Trainer Volume 3, Planning and Design of Hydraulic Power System</td></tr>
<tr><td>Supplementary literature</td><td>Wiesław Szenajch - Pneumatic drive and control

Stefan Stryczek - Hydrostatic Drive, volumes 1 and 2</td></tr>
<tr><td>eResources addresses</td><td>Adresy na platformie eNauczanie:</td></tr>
<tr><td>Example issues/ example questions/ tasks being completed</td><td colspan="2">Prepare a model and conduct simulation of a circuit presented on a scheme using Matlab Simulink

Describe LS pump regulator

Draw a scheme of hydraulic control system of two axel vehicele drive

Basic functions of counterbalance valves</td></tr>
<tr><td>Work placement</td><td colspan="2">Not applicable</td></tr>
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