



## Subject card

Subject name and code	Modelling of hydraulic systems, PG_00057402						
Field of study	Mechanical Engineering						
Date of commencement of studies	February 2023		Academic year of realisation of subject		2023/2024		
Education level	second-cycle studies		Subject group		Optional subject group 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	1		Language of instruction		Polish		
Semester of study	2		ECTS credits		3.0		
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		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	15.0	0.0	45
	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	45		6.0		24.0	75
Subject objectives	The study of hydraulic systems design						
Learning outcomes	Course outcome		Subject outcome		Method of verification		
	[K7_W08] possesses widened knowledge within the range of design methods of hydraulic systems, heating and fluid-flow machines and transport devices				[SW1] Assessment of factual knowledge [SW3] Assessment of knowledge contained in written work and projects		
	[K7_W05] possesses profound knowledge on the operation of complex systems and mechanical devices, including process equipment				[SW1] Assessment of factual knowledge [SW3] Assessment of knowledge contained in written work and projects		
	[K7_U05] is able to plan and conduct the experimental research determining the parameters of a device or system, assesses the usability and correctly selects methods and tools, is able to interpret the results and estimate the measurement errors and is able to apply computer systems to simulate the operation of a machine or technology				[SU1] Assessment of task fulfilment [SU2] Assessment of ability to analyse information [SU3] Assessment of ability to use knowledge gained from the subject [SU4] Assessment of ability to use methods and tools [SU5] Assessment of ability to present the results of task		

Subject contents	1. Energy efficiency of the system. Thermal calculations. Selection of the tank. Selection of the cooler.		
	2. Design of power pack. Development of the technical documentation of the project.		
	3. Circuits with power recuperation.		
	4. Proportional valves and their selection for the hydraulic system.		
	5. Servovalve and its selection for the hydraulic system.		
	6. Load Sensing systems.		
	7. Theory of fluid flow in clearances (gaps).		
Prerequisites and co-requisites	Knowledge of the basics of hydraulics from the first cycle studies.		
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Written exam	56.0%	60.0%
	Practical exercise	56.0%	20.0%
	Project	56.0%	20.0%
Recommended reading	Basic literature	1. A. Osiecki, Hydrostatic drive of machines, WNT, Warszawa 1998. 2. Z. Szydelski, Drive and hydraulic control, WKŁ Warszawa 1999. 3. S. Stryczek, Hydrostatic drive, PWN Warszawa 1990.	
	Supplementary literature	Hydraulics and pneumatics - science and technic monthly magazine. Pneumatics - science and technic monthly magazine.	
	eResources addresses	Adresy na platformie eNauczanie: Modelowanie układów hydraulicznych, PG_00057402, MiBM, II st. stacj., sem. 2, 2023/2024 - Moodle ID: 34062 <a href="https://enauczanie.pg.edu.pl/moodle/course/view.php?id=34062">https://enauczanie.pg.edu.pl/moodle/course/view.php?id=34062</a>	
Example issues/ example questions/ tasks being completed	The heat balance of the system. Systems with proportional valves. Systems with servo valves.		
Work placement	Not applicable		