GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Hydraulic Drive Control, PG_00055515		
Field of study	Mechanical Engineering		
Date of commencement of studies	October 2021	Academic year of realisation of subject	2023/2024
Education level	first-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	3	Language of instruction	Polish
Semester of study	6	ECTS credits	5.0
Learning profile	general academic profile	Assessment form	exam
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 inż. Agnieszka Maczyszyn 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	15.0	30.0	0.0	0.0	75

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	75	5.0	45.0	125

Subject objectives

Knowlege of operation and design principles of hydrostatic drive and control systems. Knowledge of properties of system components.

Learning outcomes

Course outcome	Subject outcome	Method of verification
[K6_W08] possesses basic knowledge including the methodology of designing machine parts, mechanical devices, selection of construction materials, manufacturing and operation, with the lifetime cycle		[SW1] Assessment of factual knowledge
[K6_U07] is able to design a typical construction of a mechanical device, component or a testing station using appropriate methods and tools, adhering to the set usage criteria		[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
[K6_U05] is able to plant an experiment within the range of measuring the basic operating parameters of mechanical devices using a specialized equipment, interpret the results and reach the correct conclusions		[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

Subject contents	LECTURE: W1 (2h) throttling systemsW2 (2h) volumetric systemsW3 (2h) basic design calculations of the hydraulic systemW4 (2h) oil tanks and coolersW5 (2h) power supplies, pipelines, hoses, connections and couplingsW6-1 (1h) first start-up of the systemW6-2 (1h) liquid purityW6-3-(1h) liquid filtration and system rinsingW7 (2h) system with a proportional distributor, proportional valvesW8 (2h) hydraulic servo driveW9 (2h) Load Sensing systemsW10 (2h) systems with power recoveryW11-2 (1h) pumps for open systems and pump controllersW12-1 (1h) closed systemsW12-2 (1h) pumps and motors for closed systemsW13 (2h) logical elements, lift valvesW14 (2h) selected vehicle drive systemsW15 (2h) repetition of the material LABORATORY: L1 System with a throttle valve and system with a flow regulatorL2 Determination of the cavitation characteristics of the pumpL3 Determination of the characteristics of the hydraulic motorL4 Determination of the characteristics of the proportional distributorL5 Sequential control (including electric) of actuatorsL6 Hydrostatic transmission testL7 Actuator testing determination of friction forces in the actuatorL8 Actuator differential connectionL9 Hydraulic accumulatorsL10 Measurement of liquid contaminationL11 Measurement of liquid viscosityL12 Air in the oilL13 Pumping units (power supplies) and liquid tanksL14 Pipelines, hoses, connections and couplingsL15 Final pass or improving laboratory excercises
Prerequisites and co-requisites	Hydraulics and pneumatics - subject completed in semester IV
Assessment methods and criteria	

Subject passing criteria	Passing threshold	Percentage of the final grade
Exercises	56.0%	15.0%
Exam	56.0%	70.0%
laboratory	56.0%	15.0%

Recommended reading	Basic literature	**[1] Osiecki A. "Hydrostatyczny napęd maszyn, WNT, W-wa 2014.** [2] **Balawender A. i inniLaboratorium napędów hydraulicznych. Część 1. Podstawy hydrauliki, Wyd. IMP PAN, Gdańsk 1996.** **[3]** Sobczyk P. Hydraulika i pneumatyka. Zbiór zadań z rozwiązaniami, PWN, W-wa, 2021. [4] Szydelski Z. Napęd i sterowanie hydrauliczne. Pojazdy samochodowe, WKŁ, W-wa 1999. [5] Stryczek S. "Napęd hydrostatyczny. Tom I elementy", WNT, W-wa 1997. [6] Stryczek S.Napęd hydrostatyczny. Tom II układy", WNT, W-wa 1997. [7] Dindorf R. Napędy płynowe. Podstawy teoretyczne i metody obliczania napędów hydraulicznych i pneumatycznych, Wydawnictwo Politechniki Świętokrzyskiej. Kielce 2009. [8] Vademecum hydrauliki, tom 1. Hydraulika. Podstawy, elementy konstrukcyjne i podzespoły. Rexroth Bosch Group. [9] Vademecum hydrauliki, tom 2 Technika hydraulicznego sterowania zaworami proporcjonalnymi i serwozaworami. Rexroth Bosch Group. [10] Vademecum hydrauliki, tom 3. "Projektowanie i konstruowanie układów hydraulicznych". Rexroth Bosch Group. [11] Hydraulics Trainer, Volume 4. Logic element technology. Rexroth Bosch Group. [12] Hydraulics Trainer, Volume 6. Hydrostatic drives with control of the secondery unit. Rexroth Bosch Group. [13]Lipski J., Zwolak E., Balas W. "Hydrauliczne urządzenia środków transportu", WKŁ Warszawa, 1980.
	Supplementary literature	**worth it: https://www.lunchboxsessions.com/explore/hydraulics**
	eResources addresses	Adresy na platformie eNauczanie: Napęd i sterowanie hydrauliczne, PG_00055515 - Moodle ID: 37710 https://enauczanie.pg.edu.pl/moodle/course/view.php?id=37710
Example issues/ example questions/ tasks being completed		
Work placement	Not applicable	