



Subject card

Subject name and code	Hydrotronics and Pneumotronics, PG_00005429						
Field of study	Mechatronics, Mechatronics						
Date of commencement of studies	October 2020	Academic year of realisation of subject			2022/2023		
Education level	first-cycle studies	Subject group					
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			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 inż. Paweł Załuski					
	Teachers	dr inż. Paweł Załuski					
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	30.0	0.0	0.0	0.0	0.0	30
	E-learning hours included: 0.0						
	Address on the e-learning platform: https://enauczanie.pg.edu.pl/moodle/course/view.php?id=11601						
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 aim of the course is to learn about the construction and operation of mechatronic components and systems with electro-hydraulic and electro-pneumatic control, including programmable systems.						
Learning outcomes	Course outcome	Subject outcome			Method of verification		
	K6_U05	Students will be able to compare design solutions of hydrotronic and pneumotronic components and systems due to given application criteria, e.g. speed of operation, effect of load on speed, energy consumption, power.			[SU2] Assessment of ability to analyse information [SU3] Assessment of ability to use knowledge gained from the subject		
	K6_W10	The student has basic knowledge of development trends in the field of technical sciences and scientific disciplines: hydrotronics and pneumotronics			[SW1] Assessment of factual knowledge [SW2] Assessment of knowledge contained in presentation		
	K6_W08	The student knows and understands the processes and issues related to the construction and operation of mechatronic elements and systems with electrohydraulic and electropneumatic control, including programmable ones.			[SW1] Assessment of factual knowledge		
	K6_U06	The student is able to identify and formulate functions and methods of implementation for simple mechatronic engineering problems in the field of electrohydraulic and electropneumatic drive and control.			[SU1] Assessment of task fulfilment [SU3] Assessment of ability to use knowledge gained from the subject [SU4] Assessment of ability to use methods and tools		
	K6_W11	The student has basic knowledge about life cycle of devices, objects and fluid mechatronic systems			[SW1] Assessment of factual knowledge		

Subject contents	<p>Hydrotonics. Examples of application of electrically and electronically controlled hydraulic systems. Types of electro-hydraulic control. Transmitters. Switching control. Electromagnetic controlled manifolds and valves. Systems with electromagnetic control valves. Proportional control. Proportional electromagnets. Proportional distributors. Servo control. Servo valves with barometric, mechanical and electrical feedback. Static and dynamic characteristics of proportional valves and servo valves. Proportional and servo control systems. Hydraulic amplifiers with electric stepper motors. Computer control systems for electrohydraulic servo drives. Hydraulic control systems for manipulators and robots.</p> <p>Pneumotronics. Application of pneumatic drives with electric and programmable control. Types and control of compressors. Electropneumatic control. Variants of electropneumatic control. Sensors used in pneumatics. Electropneumatic switching valves. Relay technology. Electrical components used in electropneumatic control systems. Switching control systems. Digital electropneumatic control. Electropneumatic positioning systems. Servo valves and pneumatic servo drives. Programmable control. Pneumatic systems with PLCs.</p>											
Prerequisites and co-requisites	Basic knowledge of general mechanics, hydrostatics, hydraulics and pneumatics											
Assessment methods and criteria	<table border="1" data-bbox="448 562 1489 627"> <thead> <tr> <th data-bbox="448 562 798 593">Subject passing criteria</th> <th data-bbox="802 562 1141 593">Passing threshold</th> <th data-bbox="1145 562 1489 593">Percentage of the final grade</th> </tr> </thead> <tbody> <tr> <td data-bbox="448 600 798 627">tests</td> <td data-bbox="802 600 1141 627">56.0%</td> <td data-bbox="1145 600 1489 627">100.0%</td> </tr> </tbody> </table>			Subject passing criteria	Passing threshold	Percentage of the final grade	tests	56.0%	100.0%			
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Example issues/ example questions/ tasks being completed	<p>principle of operation of proportional electromagnet</p> <p>effect of load on actuator movement in systems with proportional spool valves</p> <p>Load Sensing systems</p> <p>principle of operation of hydraulic servo valves</p> <p>tacto-stage units in pneumatic systems</p>											

Work placement	Not applicable
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