



## Subject card

Subject name and code	Components of mechatronic systems, PG_00055456						
Field of study	Mechatronics						
Date of commencement of studies	October 2025	Academic year of realisation of subject			2027/2028		
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			Polish		
Semester of study	5	ECTS credits			3.0		
Learning profile	general academic profile	Assessment form			assessment		
Conducting unit	Institute of Mechanics and Machine Design -> Faculty of Mechanical Engineering and Ship Technology -> Faculties of Gdańsk University of Technology						
Name and surname of lecturer (lecturers)	Subject supervisor	dr hab. inż. Ryszard Jasiński					
	Teachers						
Lesson types	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	15.0	0.0	0.0	30.0	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		2.0		28.0	75
Subject objectives	Familiarize students with the elements used in mechatronic devices						

Learning outcomes	Course outcome	Subject outcome	Method of verification
	[K6_U07] is able to design elements of mechatronic systems taking into consideration given application and economic criteria, using appropriate methods, techniques and tools	Student builds hydraulic and pneumatic systems. Student takes measurements. Student analyzes the results of the measurements. Student calculates measurement errors.	[SU1] Assessment of task fulfilment [SU2] Assessment of ability to analyse information
	[K6_U10] is able - while formulating and solving mechatronic engineering tasks - to notice their systemwide and non-technical aspects	Student describes the structure and principle of operation of control elements, actuators and sensors in mechatronic systems. Student selects the basic elements for the mechatronic system. When formulating and solving mechatronics engineering tasks, the student is able to see their systemic and non-technical aspects.	[SU1] Assessment of task fulfilment [SU2] Assessment of ability to analyse information
	[K6_W03] has organized and theoretically supported, advanced knowledge in the field of automation and control theory of stationary, continuous and discrete mechatronic systems, mechatronic design, developments and exploitation of mechatronic systems	Student builds hydraulic and pneumatic systems. student takes measurements. Student analyzes the results of the measurements. Student calculates measurement errors.	[SW3] Assessment of knowledge contained in written work and projects
[K6_U06] is able to identify and formulate specification of simple, practical engineering tasks, distinctive for mechatronics	Student describes the structure and principle of operation of control elements, actuators and sensors in mechatronic systems. Student selects the basic elements for the mechatronic system. Student is able to identify and formulate the specification of simple engineering tasks of a practical, characteristic of mechatronics.	[SU3] Assessment of ability to use knowledge gained from the subject [SU4] Assessment of ability to use methods and tools	
Subject contents	<p>Course content – lecture</p> <p>Lecture: Pneumatic, electric and hydraulic elements and sensors in mechatronic systems. Construction and operation of actuators. Signal analysis and processing. Electromagnetic actuators. Servo drives, stepper motors and their comparison. Hydraulic actuators. Classification of members of hydraulic systems. Pneumatic actuators. Control elements of mechatronic systems: electric, pneumatic and hydraulic and their comparison. Sensors. Requirements for sensors.</p> <p>Course content – project</p> <p>Part 1 of the project Sequential control in pneumatic systems. Systems with time relays, pneumatic control. Electropneumatic control. Electropneumatic control - systems with time relays, systems with counters. Design and selection of a pneumatic actuator. Computer-aided design of fluid systems. Analysis of the pneumatic system of the mechatronic MAS 200 system.</p> <p>Part 2 of the project Design of a station or device with a three-axis pneumatic manipulator.</p>		
Prerequisites and co-requisites			
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
		56.0%	40.0%
		56.0%	60.0%

Recommended reading	Basic literature	<p>Heiman B., Gerth W., Popp K.: Mechatronika, metody, przykłady, tł. Gawrysiak M., Wydawnictwo Naukowe PWN, Warszawa, 2001</p> <p>Gawrysiak M.: Mechatronika i projektowanie mechatroniczne, Polit. Białostocka, Białystok, 1997</p> <p>Giergiel J., Uhl T.: Identyfikacja układów mechatronicznych, PWN, Warszawa, 1990</p> <p>Afonin A., Szymczak P.: Mechatronika, Skrypt Politechniki Szczecińskiej, Szczecin, 2001</p> <p>Schmid D.: Mechatronika. Podręcznik dla uczniów średnich i zawodowych szkół technicznych. Rok wydania 2002, wydawnictwo: REA</p> <p>Osiecki A.: Hydrostatyczny napęd maszyn. WNT, Warszawa 1998</p> <p>Stryczek S.: Napęd hydrostatyczny. Tom 1 i 2. WNT, Warszawa 1992</p> <p>Szenajch W.: Napęd i sterowanie pneumatyczne, PWN, Warszawa, 2016</p> <p>Niegoda J., Pomierski W., Sterowanie pneumatyczne. Ćwiczenia laboratoryjne, Wydawnictwo Politechniki Gdańskiej, Gdańsk 1998</p> <p>Vademecum Hydrauliki, wyd. Bosch Rexroth</p>
	Supplementary literature	-
	eResources addresses	
Example issues/ example questions/ tasks being completed	<p>Design of a station or device with a three-axis pneumatic manipulator.</p> <p>Design and operation of rodless actuators.</p> <p>Design and operation of hydraulic actuators. Damping in actuators.</p> <p>Design and operation of pneumatic and hydraulic pendulum actuators.</p> <p>Design and operation of vacuum elements (elements generating and using vacuum).</p> <p>Pneumatic system with a compressed air generation system, air preparation unit, and actuator system.</p>	
Practical activities within the subject	Not applicable	

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