



## Subject card

Subject name and code	Components of mechatronic systems, PG_00055456						
Field of study	Mechatronics						
Date of commencement of studies	October 2023	Academic year of realisation of subject			2025/2026		
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						
Name and surname of lecturer (lecturers)	Subject supervisor		dr hab. inż. Ryszard Jasiński				
	Teachers						
Lesson types and methods of instruction	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_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_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_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_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>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>Laboratory:</p> <p>Sequential systems with pneumatic actuators.</p> <p>Pneumatic systems with time relays.</p> <p>Electropneumatic control.</p> <p>Construction and selection of a pneumatic actuator.</p> <p>Pneumatic systems with counters.Getting to know the elements of the mechatronic system MAS 200.</p> <p>Functional analysis of the MAS 200 system.Pneumatic analysis of the mechatronic system MAS 200. Electrical analysis of the mechatronic system MAS 200.</p> <p>Construction, operation and control of electric stepper motors.Hydraulic systems with accumulator.</p> <p>Sequential systems with hydraulic actuators.</p> <p>Testing the hydrostatic transmission.</p> <p>Construction, operation, determination of the characteristics of control units for classic and proportional valves.</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	Adresy na platformie eNauczanie:
	Example issues/ example questions/ tasks being completed	
Work placement	Not applicable	