



Subject card

Subject name and code	Design in mechatronics, PG_00065019						
Field of study	Mechanical and Medical Engineering						
Date of commencement of studies	February 2025	Academic year of realisation of subject			2025/2026		
Education level	second-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	1	Language of instruction			Polish		
Semester of study	2	ECTS credits			4.0		
Learning profile	general academic profile	Assessment form			exam		
Conducting unit	Zakład Konstrukcji Maszyn i Inżynierii Medycznej -> Institute of Mechanics and Machine Design -> Faculty of Mechanical Engineering and Ship Technology						
Name and surname of lecturer (lecturers)	Subject supervisor	dr hab. inż. Szymon Grymek					
	Teachers						
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		11.0		44.0	100
Subject objectives	The aim of the course is to introduce students to the concepts of mechatronics and mechatronic product, presenting problems of mechatronic design and mechatronic products designed for the needs of medicine, discussion of basic measurement systems and drives for use in mechatronics, systematising of information related to the use of computer simulation and optimization in the design of mechatronic devices.						
Learning outcomes	Course outcome		Subject outcome		Method of verification		
	[K7_U15] evaluates the feasibility of advanced methods and tools for solving complex engineering tasks of a practical nature, characteristic of the field of study, and selects and applies appropriate methods and tools for this purpose		The student is able to evaluate the usefulness of advanced methods and tools for solving a complex task in medical engineering.		[SU1] Assessment of task fulfilment [SU4] Assessment of ability to use methods and tools		
	[K7_U01] uses acquired analytical, simulation and experimental methods as well as mathematical models to solve engineering problems in the field of medical engineering		The student is able to use the design methods learned to solve engineering tasks in the field of medical engineering.		[SU1] Assessment of task fulfilment [SU4] Assessment of ability to use methods and tools		
	[K7_W04] has structured and well-founded knowledge covering issues in the field of mechanical engineering allowing to design medical devices, rehabilitation systems and to formulate research procedures		The student has a thorough knowledge of machinery design and construction, and an extended knowledge in the field of non-technical conditions of engineering activities in mechanical and medical engineering.		[SW1] Assessment of factual knowledge [SW3] Assessment of knowledge contained in written work and projects		
Subject contents	<p>Mechatronics idea, basic concepts and definitions. Interdisciplinarity and integration in mechatronic products. Mechatronic products in medicine. Basic concepts of mechatronic design. Sensors in mechatronic objects. Actuators in mechatronic objects. Controllers and control in mechatronic objects. Modelling of mechatronic objects. Simulation. Optimization. User interface in mechatronic products.</p>						

Prerequisites and co-requisites	Basic knowledge of mechanics, automatic control, metrology, electronics and computer science.		
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Design	100.0%	25.0%
	Laboratory reports	100.0%	25.0%
	Exam	50.0%	50.0%
Recommended reading	Basic literature	<p>Heimann B., Gerth W., Popp K., Mechatronika, Warszawa 2001, PWN Schmidt D. (red.), Mechatronika, Warszawa 2002, REA David G. Alciatore, Michael B. Hstand, Introduction to Mechatronics and Measurement Systems (Engineering), Mc Graw-Hill, New York 2003 Tarnowski W., Podstawy Projektowania Technicznego, Warszawa 1997, WNT Niederliński A., Systemy i sterowanie, Warszawa 1983, PWN</p> <p>Gawrysiak M.: Mechatronika i projektowanie mechatroniczne. Białystok: Wyd. Polit. Białostockiej 1997</p>	
	Supplementary literature	<p>Mrozek B., Mrozek Z., MATLAB i Simulink. Poradnik użytkownika. 2004, Helion Pratap R., MATLAB7 dla naukowców i inżynierów, 2009, PWN http://wiki.octave.org/</p>	
	eResources addresses	Adresy na platformie eNauczanie:	
Example issues/ example questions/ tasks being completed	<p>1. What is a mechatronic system? 2. Are the different scalar objective function and utility function. Give examples. 3. What is SCADA? Give examples. 4. Explain the principle of operation of the cascade control. 5. Enter the most common criteria of control quality. 6. Give and briefly comment types of drives used in mechatronics.</p>		
Work placement	Not applicable		

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