Subject card

Subject name and code	Design in mechatronics, PG_00065019
Field of study	Mechanical and Medical Engineering

Date of commencement of studies	February 2026	Academic year of realisation of subject	2026/2027
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	Division of Machine Design and Medical Engineering -> Institute of Mechanics and Machine Design -> Faculty of Mechanical Engineering and Ship Technology -> Wydziały Politechniki Gdańskiej

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_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.	[SW3] Assessment of knowledge contained in written work and projects [SW1] Assessment of factual knowledge
	[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.	[SU4] Assessment of ability to use methods and tools [SU1] Assessment of task fulfilment
	[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.	[SU4] Assessment of ability to use methods and tools [SU1] Assessment of task fulfilment

Subject contents	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.

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
	Exam	50.0%	50.0%
	Laboratory reports	100.0%	25.0%
	Design	100.0%	25.0%

Recommended reading	Basic literature	Heimann B., Gerth W., Popp K., Mechatronika, Warszawa 2001, PWN Schmidt D. (red.), Mechatronika, Warszawa 2002, REA David G. Alciatore, Michael B. Histand, Introduction to Mechatronics and Measurement Systems (Engineering), Mc Graw-Hill, New York 2003 Tarnowski W., Podstawy Projektowania Technicznego, Warszawa 1997, WNTNiederliński A., Systemy i sterowanie, Warszawa 1983, PWN Gawrysiak M.: Mechatronika i projektowanie mechatroniczne. Białystok: Wyd. Polit. Białostockiej 1997
	Supplementary literature	Mrozek B., Mrozek Z., MATLAB i Simulink. Poradnik użytkownika. 2004, Helion Pratap R., MATLAB7 dla naukowców i inżynierów, 2009, PWN http://wiki.octave.org/
	eResources addresses	

Example issues/ example questions/ tasks being completed	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.
Work placement	Not applicable

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