GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Robotics and Mechatronics Systems, PG_00057477		
Field of study	Automation, Robotics and Control Systems		
Date of commencement of studies	February 2027	Academic year of realisation of subject	2026/2027
Education level	second-cycle studies	Subject group	
Mode of study	Full-time studies	Mode of delivery	at the university
Year of study	1	Language of instruction	Polish
Semester of study	1	ECTS credits	2.0
Learning profile	general academic profile	Assessment form	exam
Conducting unit	Department of Biomechatronics -> Faculty of Electrical and Control Engineering -> Faculties of Gdańsk University of Technology		
Name and surname of lecturer (lecturers)	Subject supervisor	prof. dr hab. inż. Grzegorz Redlarski	
	Teachers		

Lesson types

Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
Number of study hours	15.0	0.0	0.0	15.0	0.0	30

E-learning hours included: 0.0

Additional information:

Lecture - in the form of multimedia presentations.Project - using computer equipment and software in the mechatronics systems laboratory.

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	6.0	14.0	50

Subject objectives

The aim of the course is to familiarize students with advanced solutions, methods and algorithms used in the field of robotics and mechatronics systems. Specific objectives concern issues in the field of: application of selected statistical analysis methods in mechatronics, selected signal analysis methods, selected swarm algorithms and classifiers, discussion of issues in the field of exoskeleton systems and advanced medical and rehabilitation robotics systems, as well as selected methods of information analysis, the source of which is expert knowledge.

Learning outcomes

Course outcome	Subject outcome	Method of verification
[K7_W06] has an extended knowledge of the design of automation components and devices, control and decision support systems control and decision support systems and complex mechatronic systems	Designs robotics and mechatronics systems, both industrial and rehabilitation.	[SW1] Assessment of factual knowledge
[K7_K02] can interact and work in a group assuming various roles and identify priorities for the achievement of a specific task	Collaborates in a group by taking on various roles, i.e.: divides the project into tasks, carries out assigned tasks, and integrates the results of work carried out by team members into a coherent whole.	[SK1] Assessment of group work skills

Subject contents	Course content – lecture Lecture: Presentation of analogies and divergences in the field of feedback occurring in technical systems. Discussion of methods for analyzing non-stationary signals. Presentation of selected swarm algorithms and classifiers commonly used in robotics and mechatronics, as well as the most frequently used testing functions in this field. Discussion of the principles of statistical analysis in robotics and mechatronics. Presentation of the possibilities of the wavelet analysis method, taking into account the diversity of practical applications. Discussion of exoskeleton systems in terms of construction and principle of operation, as well as measurement and executive systems. Presentation of selected solutions in the field of medical and rehabilitation robotics and the so-called virtual reality. Discussion of the pairwise comparison method in exemplary technical applications based on expert knowledge. Course content – project Project: Implementation of a project demonstrating in a practical way the issues presented in the lecture.
Prerequisites and co-requisites	The student has basic knowledge of the basics of robotics and mechatronics.

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
	60.0%	50.0%
	60.0%	50.0%

Recommended reading

Basic literature	W. Bolton.: Mechatronics: Electronic Control Systems in Mechanical and Electrical Engineering, 7th edition
Supplementary literature	1. Gawrysiak M.: Mechatronika i projektowanie mechatroniczne (in Polish), Politechnika Białostocka, Białystok, 1997. 2. Giergiel J., Uhl T.: Identyfikacja układów mechatronicznych (in Polish), PWN, Warszawa, 1990.
eResources addresses	Basic https://www.pearson.com/store/p/mechatronics-electronic-control-systems-in-mechanical-and-electrical-engineering/P100001284100 - please read the material and the license

Example issues/ example questions/ tasks being completed	1. Method of eliminating interference from the environment 2. Classification of results using swarm classifiers 3. Applications of exoskeletons in military and rehabilitation systems 4. Test functions - the essence and principle of use 5. Robotic rehabilitation system - development prospects
Practical activites within the subject	Not applicable

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