



Subject card

Subject name and code	Fundamentals of mechatronics and artificial intelligence, PG_00055061						
Field of study	Management and Production Engineering						
Date of commencement of studies	October 2021	Academic year of realisation of subject			2022/2023		
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	2	Language of instruction			Polish		
Semester of study	4	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	dr hab. inż. Ryszard Jasiński dr hab. inż. Marek Galewski					
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	15.0	0.0	30.0	0.0	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	4.0		26.0	75	
Subject objectives	Providing the students essential definitions and methods in the fields of Mechatronics and Artificial Intelligence						

Learning outcomes	Course outcome	Subject outcome	Method of verification
	[K6_W02] has knowledge of materials, their properties and research methods, including construction materials used in the machinery industry, has ordered, theoretically founded knowledge of mechanics including modeling of mechanical systems in the field of statics, kinematics and dynamics, and has an ordered, theoretically founded knowledge in the field of strength analysis materials and products	Student develops simulation models of basic elements of mechatronic systems	[SW1] Assessment of factual knowledge
	[K6_U07] is able to conduct a preliminary economical analysis of undertaken engineering activities, is able to can conduct a critical analysis and evaluation of existing production processes and courses of selected sections of manufacturing systems, is able to identify the needs of the application of technical solutions for automation and / or robotization production stations and formulate the specifications of the resulting benefits and limitations	Student formulates sepcifiacion for simple mechatronic projects	[SU5] Assessment of ability to present the results of task
	[K6_U08] can assess the usefulness of routine methods and tools for solving practical production tasks in measuring in order to supervise processes and analyze the functioning of production systems	Student selects proper techniques for modelling and mechatronic design as well as adopts Ai algorithms adequate to the given task	[SU1] Assessment of task fulfilment
	[K6_K01] feels the need for self-realization by learning throughout life, is looking for modern and innovative solutions in their actions, is able to think creatively and act in an entrepreneurial way	Student kows current state od AI developement and is aware of a high progrss rate in ths field	[SK4] Assessment of communication skills, including language correctness
	[K6_U06] when formulating and solving engineering tasks a student can see aspects of system management and organization of individual and as a team, taking into account the human factor, has necessary peparation for work in an industrial environment, and knows the rules and standards related to occupational health and safety	Student presents principles of interdisciplinary approach to mechatronic design	[SU3] Assessment of ability to use knowledge gained from the subject
Subject contents	<p>Introduction to mechatronics  Essential problems of mechatronic design  Interdisciplinaru design in mechatronics  Integration of various elements in mechatronic systems  Signal processing and analysis  Introduction to Artificial Intelligence  Core AI methods  Evolutionary algorithms  Artificial Neural Networks and Deep Learning</p> <p>Laboratory  - modelling of mechatronic system elemnts  - Artificial Neural Networks and Deep Learning</p>		
Prerequisites and co-requisites			
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Finishing of tasks given during laboratory classes	60.0%	40.0%
	Written test	55.0%	60.0%
Recommended reading	Basic literature	Mechatronika i projektowanie mechatroniczne. Białystok: Wyd. Polit. Białostockiej 1997. Rutkowski L., Metody i techniki sztucznej inteligencji, PWN, Warszawa, 2018	

	Supplementary literature	AI tutorials for Matlab at mathworks.com
	eResources addresses	Adresy na platformie eNauczenie: Podstawy mechatroniki i sztuczna inteligencja - Moodle ID: 28783 <a href="https://enauczanie.pg.edu.pl/moodle/course/view.php?id=28783">https://enauczanie.pg.edu.pl/moodle/course/view.php?id=28783</a>
Example issues/ example questions/ tasks being completed	Sample questions: Describe the drives of mechatronic devices. Elements of vacuum technology. Construction and principle of operation of a linear servo motor.	
Work placement	Not applicable	

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