

於。GDAŃSK UNIVERSITY 奶 OF TECHNOLOGY

Subject card

Subject name and code	Artificial intelligence, PG_00021008								
Field of study	Technical Physics								
Date of commencement of studies	October 2020		Academic year of realisation of subject			2021/2022			
Education level	first-cycle studies		Subject group			Optional subject group 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			4.0			
Learning profile	general academic profile		Assessment form			assessment			
Conducting unit	Department of Theore	etical Physics a	and Quantum Ir	nformation -> F	aculty c	of Applie	ed Physics an	d Mathematics	
Name and surname	Subject supervisor	dr inż. Paweł Syty							
of lecturer (lecturers)	Teachers		dr inż. Paweł						
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Projec	t	Seminar	SUM	
	Number of study hours	30.0	0.0	0.0	0.0		15.0	45	
	E-learning hours included: 0.0								
	Address on the e-learning platform: https://enauczanie.pg.edu.pl/moodle/course/view.php?id=19689 Adresy na platformie eNauczanie:								
Learning activity and number of study hours	Learning activity Participation ir classes includ plan		n didactic Participation in ed in study consultation hours		Self-study		SUM		
	Number of study hours	45		0.0		0.0		45	
Subject objectives	Student knows the extent of research on artificial intelligence Student knows the principles of building systems for automatic inference Students know what are the strategies of doubles games Student knows the principle of operation and application of genetic algorithms Student knows the principle of operation and applications machine learning and neural networks Student knows the principle of operation and application of cellular automata								
Learning outcomes	Course outcome		Subject outcome			Method of verification			
	K6_U08		The student has knowledge of artificial intelligence and can present it.			[SU2] Assessment of ability to analyse information [SU5] Assessment of ability to present the results of task			
	K6_W02		The student has knowledge of artificial intelligence and can use it in practice			[SW1] Assessment of factual knowledge [SW3] Assessment of knowledge contained in written work and projects			
	K6_U07		The student has knowledge of artificial intelligence and is able to present it in a popular way.			[SU3] Assessment of ability to use knowledge gained from the subject [SU4] Assessment of ability to use methods and tools			

Subject contents	LECTURE 1st The importance of intelligence. Natural and artificial intelligence. The scope of research into artificial intelligence. 2nd Inference. The syntax and semantics of the language of logic. Construction of automated reasoning. 3rd Language PROLOG inference system as an example, the realization of the principle of automatic inference, sample predicates. PROLOG as a declarative language. 4th Genetic algorithms. Encoding function adaptation, mating, mutation. Applications of genetic algorithms to solve NP problems. 5th Fuzzy logic. The role of imperfect knowledge in the inference. Bayesian inference. 6th Inference as the task of searching space. A review of selected strategies search space: search in depth and breadth of the growth method, random walk, simulated annealing. 7th Doubles game strategies. MINMAX algorithm and alpha-beta pruning. 8th Inductive inference. Discussion of conditional attribute properties. The principle of learning from the teacher. Error function. The problem of generalization. Role trenującego and test set. 9th Methods for construction of decision trees. 10th Machine learning and Neural Networks. The problem of multilayer perceptron learning. 11th Recursive neural networks - Hopfield network, Boltzmann machine. Self-organizing maps - Kohonen networks. 12th With reinforcement learning as a method of approximation of functions. Discussion of features. 13th Selected applications of neural networks. 14th Introduction to cellular automata. Gödel's theorem. Turing machine. 15th Applications of artificial intelligence in the media. Image recognition, speech and speakers.						
Prerequisites							
and co-requisites		1	1				
Assessment methods	Subject passing criteria	Passing threshold	Percentage of the final grade				
	Presenting a talk	50.0%	40.0%				
	Interview	50.0%	60.0%				
Recommended reading	Basic literature	BA. Mordechai, Logika matematyczna w informatyce, WNT, Warszawa, 2005 P. Cichosz, Systemy uczące się, WNT, Warszawa, 2000 S. Osowski, Sieci neuronowe w ujęciu algorytmicznym, WNT, Warszawa, 1999 A. Géron, Uczenie maszynowe z użyciem Scikit-Learn i TensorFlow. Wydanie II, O'Reilly, 2020					
	Supplementary literature	 J. Arabas, Wykłady z algorytmów ewolucyjnych, WNT, Warszawa, 2001 S. Russell, P. Norvig, Artificial Intelligence. A Modern Approach (2nd ed.), Prentice-Hall, Berkeley, 2003 U. Nilsson, J. Maluszynski, Logic, Programming and Prolog (2nd ed.), John Wiley & Sons Ltd, NY, 2000 					
	eResources addresses						
Example issues/ example questions/ tasks being completed	During the seminars students develop topics directly related to the theme of the lecture. Some issues are purely theoretical and requires some programming. Sample topics to develop: - Expert systems Artificial intelligence in the automotive industry Artificial intelligence in computer games Programming in Prolog. The use of language to solve logical tasks Fighting spam using Bayesian classifier Artificial intelligence - threats and opportunities Neural networks in practice (an overview of the SNNS - Stuttgart Neural Network Simulator) Modelling of traffic and the spread of the gas by using cellular automata Kalman Filtering Gödel's theorem.						
Work placement	Not applicable						