



## Subject card

Subject name and code	Artificial intelligence, PG_00045310						
Field of study	Data Engineering						
Date of commencement of studies	October 2022	Academic year of realisation of subject			2023/2024		
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			5.0		
Learning profile	general academic profile	Assessment form			exam		
Conducting unit	Department of Computer Architecture -> Faculty of Electronics, Telecommunications and Informatics						
Name and surname of lecturer (lecturers)	Subject supervisor	dr inż. Jerzy Dembski					
	Teachers	mgr inż. Adam Sobociński dr inż. Jerzy Dembski					
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	15.0	0.0	30.0	15.0	0.0	60
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	60	10.0		55.0	125	
Subject objectives	A goal of the course is to teach students the basic paradigms of artificial intelligence with particular emphasis on neural networks, genetic algorithms and fuzzy logic.  66/5000						
Learning outcomes	Course outcome	Subject outcome			Method of verification		
	[K6_W06] Knows the criteria and concepts of artificial intelligence, understands the operation of algorithms for intelligent computing, the concept of descriptive logic, combinatorial optimization algorithms, methods of construction, analysis and evaluation of algorithms, including discrete ones and problems of resolving conflicts in non-algorithmic decision making.	knows artificial intelligence paradigms			[SW1] Assessment of factual knowledge		
	[K6_W08] Knows the models and structure of the data mining process and their multidimensional analysis and can assess the results of such analyses	student is able to build intelligent data processing models			[SW1] Assessment of factual knowledge		
	[K6_U03] analyses problems and creates appropriate models, data structures and algorithms (including heuristic and numerical ones), assesses their computational complexity, estimates errors of the received solutions	student knows discrete optimization methods			[SU1] Assessment of task fulfilment		

Subject contents	1. Organization of the course and assessment criteria 2. Definitions of AI, overview of methods and applications 3. Philosophy of AI 4. Graph searching methods: breadth first, depth-first, Dijkstra, A* 5. Graph searching methods: ant colony optimization 6. AND/OR graph searching methods: introduction 7. AND/OR graph searching methods: minimax and alpha-beta pruning methods 8. AND/OR graph searching methods: computer chess 9. Knowledge representation and reasoning: introduction to first order logic 10. Knowledge representation and reasoning: resolution 11. Knowledge representation and reasoning: examples and refinements 12. Knowledge representation and reasoning: frames and description logic 13. Fuzzy inference systems: Mamdani and Sugeno inferences 14. Bayesian networks: overview and types of applications 15. Bayesian networks: methods of computing of probabilities 16. Machine learning: overview of types of learning, algorithms of learning and learned structures 17. Machine learning: gradient and Levenberg Marquardt algorithms 18. Machine learning: random search and simulated annealing algorithms 19. Machine learning: evolutionary algorithms 20. Machine learning: genetic programming 21. Machine learning: particle swarm optimization 22. Machine learning: artificial immune system algorithms 23. Machine learning: artificial neural networks, structures and basic properties 24. Machine learning: artificial neural networks - supervised learning 25. Artificial neural networks - recurrent networks 26. Machine learning: learning of fuzzy systems (ANFIS) 27. Machine learning: decision trees construction 28. Machine learning: generalisation problems, VC dimension and Vapnik inequality 29. Reinforcement learning: overview and types of multistage decision processes 30. Reinforcement learning: reinforcement learning algorithms 31. Unsupervised learning: clustering algorithms and self-organizing features maps			
Prerequisites and co-requisites				
Assessment methods and criteria	Subject passing criteria		Passing threshold	Percentage of the final grade
	Evaluation of the test (Lecture)		60.0%	50.0%
	Evaluation of laboratory		60.0%	25.0%
	Evaluation of the project		60.0%	25.0%
Recommended reading	Basic literature		<p>Jędruch W.: Sztuczna inteligencja: Materiały do wykładu, 220 str., Gdańsk, 2010</p> <p>Russel S., Norvig P.: Artificial Intelligence, Prentice-Hall, London. 2009</p> <p>Rutkowski L.: Metody i techniki sztucznej inteligencji, Wydawnictwo Naukowe PWN, Warszawa 2009.</p>	
	Supplementary literature		<p>Duch W., Korbicz J., Rutkowski L., Tadeusiewicz R.: Sieci neuronowe. AOW Exit, Warszawa 2000</p> <p>Michalewicz Z.: Algorytmy genetyczne + struktury danych = programy ewolucyjne. WNT, Warszawa 2003</p> <p>Żurada J., Barski M., Jędruch W.: Sztuczne sieci neuronowe. PWN, Warszawa 1996</p>	
	eResources addresses		<p>Adresy na platformie eNauczanie:</p> <p>Artificial Intelligence - Summer 2023/24 - Moodle ID: 36675  <a href="https://enauczanie.pg.edu.pl/moodle/course/view.php?id=36675">https://enauczanie.pg.edu.pl/moodle/course/view.php?id=36675</a></p>	
Example issues/ example questions/ tasks being completed				
Work placement	Not applicable			