GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Artificial Intelligence, PG_00047668		
Field of study	Informatics		
Date of commencement of studies	October 2023	Academic year of realisation of subject	2024/2025
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 hab. inż. Julian Szymański	
	Teachers	dr hab. inż. Julian Szymański	

Lesson types and methods of instruction

Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
Number of study hours	30.0	0.0	15.0	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	2.0	63.0	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.

Learning outcomes

Course outcome	Subject outcome	Method of verification
[K6_U06] can analyse the operation of components, circuits and systems related to the field of study, measure their parameters and examine technical specifications	student is familiar with genetic algorithms as well as fuzzy logic	[SU1] Assessment of task fulfilment
[K6_W05] Knows and understands, to an advanced extent, methods of supporting processes and functions, specific to the field of study	knows methods of neural network training	[SW1] Assessment of factual knowledge

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 processess 30. Reinforcement learning: reinforcement learning algoithms 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 project	60.0%	25.0%
	Evaluation of laboratory	60.0%	25.0%
	Evaluation of the test (Lecture)	60.0%	50.0%
Recommended reading	Basic literature	Jędruch W.: Sztuczna intrligencja: Materiały do wykładu, 220 str., Gdańsk, 2010 Russel S., Norvig P.: Artificial Intelligence, Prentice-Hall, London. 2009 Rutkowski L.: Metody i techniki sztucznej inteligencji, Wydawnictwo Naukowe PWN, Warszawa 2009.	
	Supplementary literature	Duch W., Korbicz J., Rutkowski L., Tadeusiewicz R.: Sieci neuronowe. AOW Exit, Warszawa 2000 Michalewicz Z.: Algorytmy genetyczne + struktury danych = programy ewolucyjne. WNT, Warszawa 2003 Żurada J., Barski M., Jędruch W.: Sztuczne sieci neuronowe. PWN, Warszawa 1996	
	eResources addresses	Adresy na platformie eNauczanie: Sztuczna inteligencja - Moodle ID: 44291 https://enauczanie.pg.edu.pl/moodle/course/view.php?id=44291	
Example issues/ example questions/ tasks being completed			
Work placement	Not applicable		

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