Subject card

Subject name and code	Artificial Intelligence, PG_00047668
Field of study	Informatics

Date of commencement of studies	October 2024	Academic year of realisation of subject	2025/2026
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 -> Faculties of Gdańsk University of Technology
Name and surname of lecturer (lecturers)	Subject supervisor — dr hab. inż. Julian Szymański
	Teachers — dr hab. inż. Julian Szymański

Lesson types	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						
	eNauczanie source address: https://enauczanie.pg.edu.pl/2025/course/view.php?id=4513						
	Moodle ID: 4513 Sztuczna Inteligencja https://enauczanie.pg.edu.pl/2025/course/view.php?id=4513						

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_W10] knows and understands to an advanced degree the basic processes occurring in the life cycle of equipment, objects and technical systems, as well as methods of supporting processes and functions, specific to the field of study	Knows basic machine learning methods	[SW1] Assessment of factual knowledge
	[K6_U12] is able, to an advanced degree, to analyze the operation of components and systems related to the field of study, and to measure their parameters and study their technical characteristics, as well as to plan and carry out experiments related to the field of study, including measurements and computer simulations, and to interpret the obtained results and draw conclusions	is able to conduct data analysis by him/her self	[SU2] Assessment of ability to analyse information
	[K6_K03] is ready to meet social obligations, co-organise activities for the social environment, initiate actions for the public interest, think and act in an entrepreneurial way	can apply AI algorithms to solve selected engineering problems	[SK5] Assessment of ability to solve problems that arise in practice

Subject contents	Course content – lecture
	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 algorithms. 31. Unsupervised learning: clustering algorithms and self-organizing features maps
	Course content – laboratory
	1. Regression 2. Genetic Algorithms 3. Search Methods 4. Classification 5. Clustering 6. Neural Networks 7. Reinforcement Learning
	Course content – project
	Implementation of a selected task implementing machine learning methods.
Prerequisites and co-requisites	

Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Evaluation of laboratory	60.0%	25.0%
	Evaluation of the project	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	

Example issues/ example questions/ tasks being completed	
Practical activites within the subject	Not applicable

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