GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Artificial Intelligence - laboratory, PG_00047589						
Field of study	Automatic Control, Cybernetics and Robotics						
Date of commencement of studies	October 2020		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	3		Language of instruction		Polish		
Semester of study	5		ECTS credits		1.0		
Learning profile	general academic profile		Assessment form		assessment		
Conducting unit	Department of Decision Systems and Robotics -> Faculty of Electronics, Telecommunications and Informatics						
Name and surname of lecturer (lecturers)	Subject supervisor		dr inż. Tomasz Białaszewski				
	Teachers		dr inż. Tomasz Białaszewski				
			dr hab. inż. Wojciech Jędruch				

Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	0.0	0.0	15.0	0.0	0.0	15
	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	15	1.0	9.0	25

Subject objectives	Understanding by the students of the basic branches of artificial intelligence with respect to their applications in automation and solution of selected problems during laboratory classes

Learning outcomes	Course outcome	Subject outcome	Method of verification
	[K6_U07] can apply methods of process and function support, specific to the field of study	Student is able to solve the problems of artificial intelligence using the PROLOG language. Student uses MATLAB toolbox to model of fuzzy control systems.	[SU4] Assessment of ability to use methods and tools [SU1] Assessment of task fulfilment
	[K6_U01] can apply mathematical knowledge to formulate and solve complex and non-typical problems related to the field of study and perform tasks, in an innovative way, in not entirely predictable conditions, by:n- appropriate selection of sources and information obtained from them, assessment, critical analysis and synthesis of this information,n- selection and application of appropriate methods and toolsn	Student is able to design an appropriate artificial neural network in MATLAB environment for approximation, classification and prediction problems Student uses the simulated annealing algorithm to solve optimization problems Student implements the Bayes network to design of the decision system	[SU4] Assessment of ability to use methods and tools [SU1] Assessment of task fulfilment

Subject contents	1. The organization classes and rules for passing
	2. Programming in PROLOG - introduction
	3. Programming in PROLOG - the basic language constructs, unification, conversion
	4. Programming in PROLOG - control conversion, recursion
	5. Programming in PROLOG - are examples of the complex problems of artificial intelligence
	6. Modeling of fuzzy systems using MATLAB - Introduction
	7. Modeling of fuzzy systems using MATLAB - Sample applications
	8. Constructing learning and artificial neural networks in MATLAB - Introduction
	9. Constructing learning and artificial neural networks in MATLAB - Sample applications
	10. Machine Learning - examples of algorithms
	11. Machine Learning - implementation of simulated annealing algorithm
	12. Machine learning - implementation of a genetic algorithm
	13. Machine Learning - Algorithms construction of decision trees
	14. Bayesian Networks: Methods for calculating the probabilities

Prerequisites and co-requisites	A student should include the subject of Artificial Intelligence (lecture)

Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Five tests, each of 45 minutes	51.0%	100.0%

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.dd
	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 1999
	eResources addresses	Adresy na platformie eNauczanie: Sztuczna inteligencja w automatyce - sem. 2022/23 - Moodle ID: 26271 https://enauczanie.pg.edu.pl/moodle/course/view.php?id=26271

Example issues/ example questions/ tasks being completed	1 Programs in the PROLOG language that operate on lists (eg inverting elements of the list, selecting the appropriate item from the list, etc.)
	2 The implementation of fuzzy controllers for common tasks control theory.
	3 Application of artificial neural networks for classification tasks, approximation or prediction.
	4 Inference in Bayesian networks
	5 Application of simulated annealing and genetic algorithms for optimization tasks.

Work placement	Not applicable