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 2021	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	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 mgr inż. Kajetan Kruczkowski Barbara Klaudel	

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_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	[SU1] Assessment of task fulfilment [SU4] Assessment of ability to use methods and tools
[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.	[SU1] Assessment of task fulfilment [SU4] Assessment of ability to use methods and tools

<table>
<tr><td>Subject contents</td><td>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</td></tr>
<tr><td>Prerequisites and co-requisites</td><td>A student should include the subject of Artificial Intelligence (lecture)</td></tr>
<tr><td>Assessment methods and criteria</td><td><table><tr><th>Subject passing criteria</th><th>Passing threshold</th><th>Percentage of the final grade</th></tr><tr><td>Five tests, each of 45 minutes</td><td>51.0%</td><td>100.0%</td></tr></table></td></tr>
<tr><td>Recommended reading</td><td><table><tr><td>Basic literature</td><td>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</td></tr><tr><td>Supplementary literature</td><td>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</td></tr><tr><td>eResources addresses</td><td>Adresy na platformie eNauczanie:
Sztuczna inteligencja w automatyce - sem. 2023/24 - Moodle ID: 34215
https://enauczanie.pg.edu.pl/moodle/course/view.php?id=34215</td></tr></table></td></tr>
<tr><td>Example issues/ example questions/ tasks being completed</td><td>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.</td></tr>
<tr><td>Work placement</td><td>Not applicable</td></tr>
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