University of Gdańsk

Subject card

Subject name and code	Computational Intelligence, PG_00143904		
Field of study	Informatics		
Date of commencement of studies	October 2025	Academic year of realisation of subject	2025/2026
Education level	Master's 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	part-time studies	Mode of delivery	at the university
Year of study	1	Language of instruction	Polish
Semester of study	1	ECTS credits	7.0
Learning profile	academic	Assessment form	exam
Conducting unit	Division of Artificial Intelligence -> Institute of Informatics -> Faculty of Mathematics, Physics and Informatics -> Rector		
Name and surname of lecturer (lecturers)	Subject supervisor	mgr Grzegorz Madejski	
	Teachers		

Lesson types	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	20.0	0.0	20.0	0.0	0.0	40
	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	40	0.0	135.0	175

Subject objectives	The aim of the course is to familiarize students with the possibilities and techniques of computational intelligence. It is assumed that the participant will learn the basic techniques and acquire the ability to select appropriate models and algorithms for tasks and discuss solutions.

Learning outcomes

Course outcome	Subject outcome	Method of verification
[INFMU2_W05] knows standard methods, algorithms and techniques of artificial intelligence, their properties and importance in practical computer applications	- knows algorithms and techniques of computational intelligence: bio-inspired metaheuristic algorithms, machine learning algorithms and techniques, neural networks, basics of fuzzy logic; - knows methods for optimizing computational intelligence algorithms and methods for evaluating their effectiveness; - knows practical applications of computational intelligence techniques and algorithms.	[SW4] test/exam - oral or written
[INFMU2_U06] can solve problems using artificial intelligence methods and algorithms	- is able to analyze a problem and then choose an appropriate model from the field of computational intelligence to solve it; - is able to optimize a computational intelligence algorithm solving a given problem and then verify if the model works effectively using appropriate measures; is able to prepare documentation of the completed project, present research results, describe the method used, and justify it; - is able to use tools that facilitate solving problems using computational intelligence methods, such as Python libraries like pygad, numpy, pandas, sklearn, keras, or tensorflow.	[SU2] presentation/project/paper/ report [SU5] implementation of a problem task [SU8] observation of student's independent or team work
[INFMU2_W06] is well acquainted with the principles of health and safety in the IT profession	- knows the ethical and legal risks associated with the use of artificial intelligence; - knows the safety principles of working with large datasets, including the protection of personal and sensitive data.	[SW1] oral statement/ conversation/discussion
[INFMU2_K03] is able and ready to formulate opinions on basic IT issues	- is able to recognize the benefits and risks arising from the development of artificial intelligence	[SK1] oral statement/conversation/ discussion [SK8] observation of student's independent or team work

Subject contents

- Biologically inspired metaheuristic algorithms, with particular emphasis on the genetic algorithm.
- Supervised machine learning. Classification task.
- Unsupervised machine learning.
- Artificial neural networks. Deep learning.
- Fuzzy logic.

Prerequisites and co-requisites

- basics of programming in Python
- basics of algebra, statistics, and probability calculus

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
Solving tasks	51.0%	25.0%
Exam	51.0%	25.0%
Projects	51.0%	50.0%

Recommended reading	Basic literature	• David E. Goldberg: Algorytmy genetyczne i ich zastosowanie, WNT 2003 • Marcin Szeliga: Praktyczne uczenie maszynowe, PWN 2019 • Joel Grus: Data science od podstaw, Helion 2018 • Drew Conway, John Myles White: Uczenie maszynowe, Helion 2015 • Marcin Szeliga: Data Science i Uczenie Maszynowe, PWN 2017 • Sebastian Raschka, Vahid Mirjalili: Python. Uczenie Maszynowe, wyd. 2, Helion 2019 • Seth Weidman: Uczenie głębokie od zera. Podstawy implementacji w Pythonie, Helion 2020 • Jacek Tabor, Marek Śmieja, Łukasz Struski Przemysław: Uczenie głębokie. Wprowadzenie, Helion 2022 • Maciej Wenerski: Podstawy logiki rozmytej i wnioskowania rozmytego, 2013 • Internet tutorials
	Supplementary literature	-
	eResources addresses	
Example issues/ example questions/ tasks being completed	• Solving the knapsack problem using the genetic algorithm. • Finding an appropriate algorithm for diagnosing diabetes in individuals with given medical parameters (classification in medicine). • Creating a system based on fuzzy logic to calculate tips. • Creating a neural network to recognize whether there is a dog or a cat in a photo.	
Work placement	Not applicable	

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