University of Gdańsk

Subject card

Subject name and code	Machine Learning and Artificial Intelligence, PG_00203640		
Field of study	Informatics		
Date of commencement of studies	October 2026	Academic year of realisation of subject	2027/2028
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	2	Language of instruction	Polish
Semester of study	3	ECTS credits	5.0
Learning profile	academic	Assessment form	credit
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	85.0	125

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_W09] knows and understands formal models of data representation and structures (e.g. graphs, relational and non-relational models), knows the applications of mathematical models and data structures in solving practical problems, understands the connections between theory (e.g. graphs) and practical data processing systems (e.g. databases, Big Data systems)		
[INFMU2_W05] has in-depth knowledge of artificial intelligence algorithms and techniques, their properties and importance in practical applications		
[INFMU2_U06] can solve problems using artificial intelligence algorithms and tools		

<table>
<tr><td>Subject contents</td><td>

- 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.

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<tr><td>Prerequisites and co-requisites</td><td>

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

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<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>Solving tasks</td><td>51.0%</td><td>25.0%</td></tr>
<tr><td>Projects</td><td>51.0%</td><td>50.0%</td></tr>
<tr><td>Exam</td><td>51.0%</td><td>25.0%</td></tr>
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<tr><td>Recommended reading</td><td>
<table>
<tr><td>Basic literature</td><td>

- 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

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<tr><td>Supplementary literature</td><td>-</td></tr>
<tr><td>eResources addresses</td><td></td></tr>
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<tr><td>Example issues/ example questions/ tasks being completed</td><td>

- 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.

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<tr><td>Work placement</td><td>Not applicable</td></tr>
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