GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Introduction to Machine Learning, PG_00068096						
Field of study	Biomedical Engineering						
Date of commencement of studies	October 2025		Academic year of realisation of subject	2027/2028			
Education level	first-cycle studies		Subject group	Optional subject group 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 polish			
Semester of study	6		ECTS credits	4.0			
Learning profile	general academic profile		Assessment form	exam			
Conducting unit	Department of Biomedical Engineering -> Faculty of Electronics Telecommunications and Informatics -> Faculties of Gdańsk University of Technology						
Name and surname of lecturer (lecturers)	Subject supervisor		mgr inż. Natalia Kowalczyk				
	Teachers						
Lesson types	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	15.0	0.0	15.0	15.0	0.0	45
	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	45		4.0	51.0		100
Subject objectives	The aim of the course is to introduce students to the basic issues related to machine learning and to show the possibilities of their practical application.						

Learning outcomes

Course outcome	Subject outcome	Method of verification
[K6_W04] knows and understands, to an advanced extent, the principles, methods and techniques of programming and the principles of computer software development or programming devices or controllers using microprocessors or programmable elements or systems specific to the field of study, and organisation of systems using computers or such devices	The student has knowledge of: - the basics of data cleaning, preparation, and processing, - the use of basic classification algorithms, - the use of machine learning algorithms for data classification.	[SW1] Assessment of factual knowledge
[K6_U04] can apply knowledge of programming methods and techniques as well as select and apply appropriate programming methods and tools in computer software development or programming devices or controllers using microprocessors or programmable elements or systems specific to the field of study	The student is able to use programming libraries and appropriate software to solve problems in machine learning. They can also train a model on a selected dataset and assess its quality using adequate evaluation measures.	[SU1] Assessment of task fulfilment
[K6_U07] can apply methods of process and function support, specific to the field of study	The student has acquired the ability to: - prepare and clean data for machine learning processes, - select, train and test machine learning models using real data sets, - assess the quality of models using appropriate metrics, - implement simple ML solutions in the form of applications or analytical scripts, - work with ready-made data sets.	[SU1] Assessment of task fulfilment

Subject contents

Course content – lecture
Introduction, scope of the subject and literature.
Definitions of artificial intelligence and machine learning. Types of machine learning.
Introduction to basic libraries used in machine learning.
Preprocessing - data cleaning.
Data transformation.
Feature selection and decision trees.
Random forests and ensembles of classifiers.
Support vector machine.
Unsupervised classification.
Genetic algorithms. Fundamentals and characteristics of genetic algorithms. Selection methods, crossover, mutation.
Model training and testing. Model evaluation measures.

Prerequisites and co-requisites

A student taking the course should have:
- the ability to work with databases,
- basic knowledge of Python,
- basic competences in data analysis,
- knowledge of the basics of linear algebra and probability analysis.

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
Laboratory	51.0%	30.0%
Project	51.0%	30.0%
Exam	51.0%	40.0%

Recommended reading

Basic literature	Sebastian Raschka, Raschka, and Mirjalili Vahid Mirjalili. Python Machine Learning: Machine Learning and Deep Learning with Python, Scikit-Learn, and TensorFlow. Third edition. Packt Publishing, 2019. Géron, Aurélien, and OReilly Media Wydawca. Hands-on Machine Learning with Scikit-Learn, Keras and TensorFlow: Concepts, Tools and Techniques to Build Intelligent Systems / Aurélien Géron. Second edition, seventh release. Beijing; OReilly, 2020. Print.
Supplementary literature	Liu, Yuxi. Python Machine Learning by Example: Build Intelligent Systems Using Python, Tensorflow 2, Pytorch, and Scikit-Learn / Yuxi Liu. Third edition. Birmingham, England; Packt Publishing, Limited, 2020.
eResources addresses	

Example issues/ example questions/ tasks being completed

Practical activites within the subject	Not applicable

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