

。 GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Fundamentals of Machine Learning, PG_00053348								
Field of study	Biomedical Engineering, Biomedical Engineering, Biomedical Engineering								
Date of commencement of studies	February 2025		Academic year of realisation of subject			2025/2026			
Education level	second-cycle studies		Subject group			Optional subject group Specialty 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	2		Language of instruction			Polish			
Semester of study	3		ECTS credits			2.0			
Learning profile	general academic profile		Assessment form			exam			
Conducting unit	Department of Biomedical Engineering -> Faculty of Electronics, Telecommunications and Informatics							matics	
Name and surname	Subject supervisor		prof. dr hab. inż. Jacek Rumiński						
of lecturer (lecturers)	Teachers		prof. dr hab. inż. Jacek Rumiński						
Lesson types and methods	Lesson type	Lecture	Tutorial	Laboratory	Projec	t Seminar		SUM	
of instruction	Number of study hours	30.0	0.0	15.0	0.0		0.0	45	
	E-learning hours included: 0.0								
Learning activity and number of study hours	Learning activity	Participation in classes includ plan	n didactic ed in study	Participation in consultation hours		Self-study SUM		SUM	
	Number of study 45 hours		2.0		10.0 57				
Subject objectives	The aim of the course is to familiarize students with the basics of machine learning, in particular with data classification algorithms, linear and logistic regression, and the practical use of artificial neural networks.								
Learning outcomes	Course out	Course outcome Subject outcome				Method of verification			
	[K7_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, making assessment and critical analysis of the prepared software as well as a synthesis and creative interpretation of information presented with it		The student is able to use programming libraries and software to solve machine learning problems. The student is able to train the model using a data set and assess the quality of the model using properly selected measures.			[SU1] Assessment of task fulfilment			
	[K/_W03] knows and understands, to an increased extent, the construction and operating principles of components and systems related to the field of study, including theories, methods and complex relationships between them and selected specific issues - appropriate for the curriculum [K7_W01] knows and understands, to an increased extent, mathematics to the extent necessary to formulate and solve complex issues related to the field of study		The student knows and understands the principles of operation of selected machine learning algorithms. The student knows and understands the principles of model training with the use of a data set, and knows and understands the methods of assessing the quality of the model using properly selected measures. The student knows and understands the mathematical foundations related to selected machine learning algorithms.			[SW1] Assessment of factual knowledge			

Subject contents	Introduction - scope of the subject and literature. Definitions of artificial intelligence and machine learning. Types of machine learning. Preprocessing - data cleansing. Data transformation. Feature selection and decision trees. Random forests and ensambles of classifiers. Support vector machine. Unsupervised classification. Genetic algorithms. Basics and characteristics of genetic algorithms. Selection methods, crossing, mutation. Rule-based systems. Fuzzy logic. Fuzzy reasoning: Mamdani and Sugeno's inference. Rough sets. Linear and logistic regression. Artificial neural networks - gradient method. Artificial neural networks - model training and testing. Artificial neural networks - autocoders. Introduction to deep networks and convolutional neural networks. Practical use of convolutional networks in image classification.					
Prerequisites and co-requisites	Basics of computer programming and linear algebra.					
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade			
	laboratory exercises	51.0%	50.0%			
	exam	51.0%	50.0%			
Recommended reading	Basic literature	Sebastian Raschka, Vahid Mirjalili, Python Machine Learning, Packt, 2021 François Chollet, Deep Learning with Python, Second Edition, Manning, 2021				
	Supplementary literature	Aurélien Géron, Hands-On Machine Learning with Scikit-Learn and TensorFlow: Concepts, Tools, and Techniques to Build Intelligent Systems, O'Reilly, 2019				
	eResources addresses	Resources addresses Adresy na platformie eNauczanie:				
Example issues/ example questions/ tasks being completed						
Work placement	Not applicable					

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