

Subject card

Subject name and code	Introduction to Machine Learning, PG_00206851						
Field of study	Mathematics						
Date of commencement of studies	October 2026		Academic year of realisation of subject		2026/2027		
Education level	Master's studies		Subject group		Obligatory subject group in the field of study Optional subject group		
Mode of study	full-time studies		Mode of delivery		at the university		
Year of study	1		Language of instruction		Polish		
Semester of study	2		ECTS credits		5.0		
Learning profile	academic		Assessment form		exam		
Conducting unit							
Name and surname of lecturer (lecturers)	Subject supervisor		dr hab. inż. Marek Krośnicki				
	Teachers						
Lesson types	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	30.0	0.0	30.0	0.0	0.0	60
	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	60		3.0		62.0	125
Subject objectives	Familiarization with advanced machine learning methods.						
	Acquiring the ability to use machine learning algorithms - working in the Python environment						
Learning outcomes	Course outcome		Subject outcome		Method of verification		
	[MATMU2_W01] knows and understands in depth the theory of selected areas of mathematics or related fields, the complex relationships between them and their development trends		1. The student is able to solve programming problems using mathematical knowledge, design and analyze algorithms in terms of their correctness using dedicated tools and design patterns 2. The student is able to perform actual preprocessing of data		[SW4] test/exam - oral or written [SW2] presentation/project/paper/report		
	[MATMU2_U05] is able to apply new or adapt existing methods and tools from a selected field of mathematics and information and communication technologies in related fields		The student is able to create models for data of various types (images, texts, chemical compounds)		[SU2] presentation/project/paper/report		

Subject contents	1. Introduction to basic terminology and notation. Strategy for creating a machine learning system 2. Python in machine learning. Using Python for machine learning: Anaconda, Jupyter, NumPy, Pandas, Matplotlib, SciPy. 3. Data preprocessing. Best practices for model evaluation. 4. Data analysis using regression analysis, cluster analysis 5. Support Vector Machines 6. Decision trees 7. Training neural networks using torch library 8. Auroencoders 9. Data compression and data dimension reduction 10. Unsupervised learning methods (e.g. k-means algorithm) 11. Application examples: Modeling sequential data using recurrent neural networks, working with text, working with images, working with molecular graphs		
Prerequisites and co-requisites	Knowledge of programming basics, algorithms and complexity, object-oriented programming languages and paradigms in the languages chosen by the student.		
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	projects	51.0%	70.0%
	oral exam	51.0%	30.0%
Recommended reading	Basic literature	1. G. James, D. Witten, T. Hastie, R. Tibshirani, J. Taylor n Introduction to Statistical Learning with applications in Python, 2023, https://www.statlearning.com/ 2. S. Raschka, V. Mirjalili, Python Machine Learning, Packt 2019	
	Supplementary literature	N/A	
	eResources addresses		
Example issues/ example questions/ tasks being completed			
Work placement	Not applicable		

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