

Subject card

Subject name and code	Introduction to Machine Learning, PG_00143545						
Field of study	Informatics						
Date of commencement of studies	October 2024	Academic year of realisation of subject				2025/2026	
Education level	Bachelor's studies	Subject group				Obligatory subject group 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 Polish	
Semester of study	4	ECTS credits				4.0	
Learning profile	academic	Assessment form					
Conducting unit	Division of Quantum Computing -> Institute of Informatics -> Faculty of Mathematics, Physics and Informatics -> Rector						
Name and surname of lecturer (lecturers)	Subject supervisor		dr inż. Paweł Mazurek				
	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		0.0		40.0	100
Subject objectives	<p>1. Obtaining the basic methods of machine learning</p> <p>2. Acquiring the ability to use basic machine learning algorithms - working in the Python environment</p> <p>3. Mastering mathematical methods of modeling problems and machine learning tools and assessing their usefulness</p>						
Learning outcomes	Course outcome		Subject outcome			Method of verification	
	[INFL3_W03] has structured, theoretically grounded general knowledge in the field of algorithms and data structures, formal languages, automata theory and computational complexity, and artificial intelligence		<p>1. The student is able to use the Python environment for machine learning.</p> <p>2. The student knows data analysis methods.</p> <p>3. The student is able to use selected library tools to train neural networks.</p>			<p>[SW4] test/exam - oral or written</p> <p>[SW2] presentation/project/paper/report</p> <p>[SW5] implementation of a problem task</p>	
	[INFL3_W10] knows the basic principles of occupational health and safety in the IT profession		Analysis of the workplace in the laboratory room in terms of occupational health and safety rules.			[SW4] test/exam - oral or written	

Subject contents	<p>1. Introduction to basic terminology and notation, familiarization of students with nomenclature in English. System creation strategy in machine learning 2. Python in machine learning. Using the Python environment for machine learning: Anaconda, Jupyter, NumPy, Pandas, Matplotlib, SciPy. 3. Data pre-processing. Best model evaluation methods and parametric tuning. 4. Data analysis using regression analysis, cluster analysis 5. Training neural networks using the scikit learn library 6. Application examples: (i) Modeling sequential data using recurrent neural networks (ii) Working with text (iii) Working with images</p>		
Prerequisites and co-requisites	<p>Knowledge of the basics of programming, algorithms and complexity, languages and paradigms of object-oriented programming in the languages chosen by the student.</p>		
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	a test exam of lecture content	51.0%	30.0%
	graded project	51.0%	70.0%
Recommended reading	Basic literature	<p>1. M. Szeliga, Data science i uczenie maszynowe, Wydawnictwo naukowe PWN, Warszawa, 2017.</p> <p>2. T. Morzy, Eksploracja danych metody i algorytmy, Wydawnictwo naukowe PWN, Warszawa, 2013.</p> <p>3. Christopher M. Bishop Pattern Recognition and Machine Learning, Springer, 2007</p>	
	Supplementary literature	<p>1. J. Koronacki, J. Ówik: Statystyczne systemy uczące się. Wydanie drugie, EXIT, Warszawa, 2007 2. K. Krawiec, J. Stefanowski, Uczenie maszynowe i sieci neuronowe. Wydawnictwo Politechniki Poznańskiej, Poznań, 2004 3. P. Cichosz, Systemy uczące się, WNT, Warszawa, 2000 4. W. Duch, J. Korbicz, L. Rutkowski, R. Tadeusiewicz, Sieci neuronowe, Exit, Warszawa, 2000 5. M. Gągolewski, M. Bartoszek, A. Cena, Przetwarzanie i analiza danych w języku Python, PWN, 2016 6. W. McKinney, Python for Data Analysis. Data Wrangling with Pandas, NumPy, and IPython, O'Reilly Media, 2012 7. W. Richert, L.P. Coelho, Building Machine Learning Systems with Python, Packt Publishing, 2013 8. M. Lutz, Learning Python, O'Reilly Media, 2013 9. E. Bressert, SciPy and NumPy, O'Reilly Media, 2012</p>	
	eResources addresses		
Example issues/ example questions/ tasks being completed	<p>1. Stock price prediction using regression and neural networks. 2. Movie preference prediction using Bayesian inference. 3. Face recognition using Support Vector Machine.</p> <p>4. Text topic recognition with clustering method.</p>		
Work placement	Not applicable		

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