University of Gdańsk

Subject card

Subject name and code	Introduction to Machine Learning, PG_00198500		
Field of study	Informatics		
Date of commencement of studies	October 2026	Academic year of realisation of subject	2027/2028
Education level	Bachelor'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	full-time studies	Mode of delivery	at the university
Year of study	2	Language of instruction	Polish
Semester of study	4	ECTS credits	5.0
Learning profile	academic	Assessment form	credit
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	65.0	125

Subject objectives

1. Obtaining the basic methods of machine learning

2. Acquiring the ability to use basic machine learning algorithms - working in the Python environment

3. Mastering mathematical methods of modeling problems and machine learning tools and assessing their usefulness

Learning outcomes

Course outcome	Subject outcome	Method of verification
[INFOL3_U06] can select and apply appropriate methods and IT tools to solve complex problems		
[INFOL3_U02] is able to use his/her knowledge of higher mathematics to model and solve complex problems		
[INFOL3_W06] knows and understands advanced models of database systems, with particular emphasis on the relational model		
[INFOL3_W03] knows and understands advanced concepts in the field of algorithms and data structures, formal languages, automata theory and computational complexity, and artificial intelligence	1. The student is able to use the Python environment for machine learning. 2. The student knows data analysis methods. 3. The student is able to use the TensorFlow library tools to train neural networks.	[SW4] test/exam - oral or written [SW2] presentation/project/paper/report

<table>
<tr><td>Subject contents</td><td>1.Introduction to basic terminology and notation. System creation strategy in machine learning2. 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 analysis5.Training neural networks using the TensorFlow library6. Application examples:(i) Modeling sequential data using recurrent neural networks(ii) Working with text(iii) Working with images</td></tr>
<tr><td>Prerequisites and co-requisites</td><td>Knowledge of the basics of programming, algorithms and complexity, languages and paradigms of object-oriented programming in the languages chosen by the student.</td></tr>
<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>a test exam of lecture content</td><td>51.0%</td><td>50.0%</td></tr>
<tr><td>graded project</td><td>51.0%</td><td>50.0%</td></tr>
</table></td></tr>
<tr><td>Recommended reading</td><td><table>
<tr><td>Basic literature</td><td>1. M. Szeliga, Data science i uczenie maszynowe, Wydawnictwo naukowe PWN, Warszawa, 2017.

2. T. Morzy, Eksploracja danych metody i algorytmy, Wydawnictwo naukowe PWN, Warszawa, 2013.

3. Christopher M. Bishop Pattern Recognition and Machine Learning, Springer, 2007</td></tr>
<tr><td>Supplementary literature</td><td>1. J. Koronacki, J. Ćwik: Statystyczne systemy uczące się. Wydanie drugie, EXIT, Warszawa, 20072. K. Krawiec, J.Stefanowski, Uczenie maszynowe i sieci neuronowe. Wydawnictwo Politechniki Poznańskiej, Poznań, 2004,3. P. Cichosz, Systemy uczace sie, WNT, Warszawa, 2000.4. W. Duch, J. Korbicz, L.Rutkowski,R. Tadeusiewicz, Sieci neuronowe, Exit, Warszawa, 20005. M. Gągolewski, M. Bartoszuk, A. Cena, Przetwarzanie i analiza danych w języku Python, PWN, 20166. W. McKinney, Python for Data Analysis. Data Wrangling with Pandas, NumPy, and IPython, O'Reilly Media, 20127. W. Richert, L.P. Coelho, Building Machine Learning Systems with Python, Packt Publishing, 20138. M. Lutz, Learning Python, O'Reilly Media, 20139.. E. Bressert, SciPy and NumPy, O'Reilly Media, 2012</td></tr>
<tr><td>eResources addresses</td><td></td></tr>
</table></td></tr>
<tr><td>Example issues/ example questions/ tasks being completed</td><td>None.</td></tr>
<tr><td>Work placement</td><td>Not applicable</td></tr>
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