



## Subject card

Subject name and code	Introduction to Machine Learning, PG_00068096						
Field of study	Biomedical Engineering, Biomedical Engineering, Biomedical Engineering						
Date of commencement of studies	October 2026	Academic year of realisation of subject			2028/2029		
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		
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	mgr inż. Natalia Kowalczyk					
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	<p>Course content – lecture</p> <p>Introduction, scope of the subject and literature.</p> <p>Definitions of artificial intelligence and machine learning. Types of machine learning.</p> <p>Introduction to basic libraries used in machine learning.</p> <p>Preprocessing - data cleaning.</p> <p>Data transformation.</p> <p>Feature selection and decision trees.</p> <p>Random forests and ensembles of classifiers.</p> <p>Support vector machine.</p> <p>Unsupervised classification.</p> <p>Genetic algorithms. Fundamentals and characteristics of genetic algorithms. Selection methods, crossover, mutation.</p> <p>Model training and testing. Model evaluation measures.</p>		
Prerequisites and co-requisites	<p>A student taking the course should have:</p> <ul style="list-style-type: none"> <li>- the ability to work with databases,</li> <li>- basic knowledge of Python,</li> <li>- basic competences in data analysis,</li> <li>- knowledge of the basics of linear algebra and probability analysis.</li> </ul>		
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	<p>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.</p> <p>Géron, Aurélien, and O'Reilly 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; O'Reilly, 2020. Print.</p>	
	Supplementary literature	<p>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.</p>	
	eResources addresses		
Example issues/ example questions/ tasks being completed			

Practical activities within the subject	Not applicable
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