



Subject card

Subject name and code	Integrated Information Technology Systems, PG_00060659						
Field of study	Transport and Logistics						
Date of commencement of studies	October 2024		Academic year of realisation of subject		2026/2027		
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	5		ECTS credits		5.0		
Learning profile	general academic profile		Assessment form		exam		
Conducting unit	Division of Applied Computer Science -> Institute of Naval Architecture -> Faculty of Mechanical Engineering and Ship Technology -> Faculties of Gdańsk University of Technology						
Name and surname of lecturer (lecturers)	Subject supervisor		dr inż. Paweł Chodnicki				
	Teachers		dr inż. Paweł Chodnicki				
Lesson types	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	30.0	30.0	0.0	0.0	0.0	60
	E-learning hours included: 0.0						
	eNauczanie source addresses: Moodle ID: 7643 Zintegrowane systemy informatyczne https://enauczanie.pg.edu.pl/2025/course/view.php?id=7643						
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		5.0		60.0	125
Subject objectives	Preparing students to interpret the operation of simple programs and algorithms and to analyze the applicability of machine learning methods based on knowledge of Python programming, fundamental algorithms, and selected machine learning methods in the context of supporting transportation and logistics processes.						

Learning outcomes	Course outcome	Subject outcome	Method of verification
	[K6_U06] can use appropriate methods and tools in accordance with the formulated specification; can perform a simple engineering task in the field of design, manufacture and operation of transport means and systems	U1. Can determine the output of simple programs and code fragments in Python by analyzing conditional statements, loops, functions, and objects in the context of tasks performed in transportation and logistics systems. U2. Can select an appropriate machine learning method for an analytical problem in transportation and logistics using knowledge of regression, decision trees, clustering, and neural networks. U3. Can interpret the results obtained from applying selected machine learning methods in the context of transportation and logistics problems.	[SU3] Assessment of ability to use knowledge gained from the subject [SU2] Assessment of ability to analyse information
	[K6_W04] has well established knowledge in the field of computer science, electronics, automation and control, information technology and computer graphics, useful for understanding the possibilities of applying them in transport	W1. Knows and understands the principles of operation of selected Python programming constructs and selected machine learning methods, in the context of their potential application in information systems supporting transportation and logistics processes.	[SW2] Assessment of knowledge contained in presentation
Subject contents	Course content – lecture		
	• Review of the Fundamentals of Python Programming • Object-Oriented Programming in Python • Programming as a Tool for Supporting Transportation and Logistics Systems • Introduction to Machine Learning • Regression and Classification • Similarity- and Distance-Based Methods • Decision Trees • Data Preparation and Dimensionality Reduction • Evaluation of Machine Learning Model Performance • Hyperparameters, Overfitting, and Regularization • Fundamentals of Neural Networks • Selection of Machine Learning Methods for Transportation and Logistics Problems		
	Course content – exercises		
	• Analysis of Basic Python Constructs • Analysis of Object-Oriented Programming in Python • Analysis of the Functionality of Transportation and Logistics Systems • Identification of Machine Learning Problems • Regression and Classification – Selection of Methods • Decision Trees – Analysis and Interpretation • SVM and k-NN – Method Selection and Result Interpretation • K-Means and DBSCAN – Clustering and Result Interpretation • Data Preparation and Dimensionality Reduction • Evaluation of Machine Learning Model Performance • Hyperparameters, Overfitting, and Regularization • Fundamentals of Neural Networks • Selection and Interpretation of Machine Learning Methods in Transportation and Logistics		
Prerequisites and co-requisites	Basic knowledge of Python programming and fundamental programming constructs. Basic skills in mathematical calculations, data analysis, and data interpretation. Knowledge of basic terminology and concepts related to transportation and logistics. Basic analytical and logical problem-solving skills.		
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Tutorial - Tests	50.0%	50.0%
	Lecture - Exam	50.0%	50.0%

Recommended reading	Basic literature	1. Raschka, S., Liu, Y. H., & Mirjalili, V. (2022). Machine Learning with PyTorch and Scikit-Learn: Develop machine learning and deep learning models with Python. Packt Publishing Ltd. 2. Géron, A. (2022). Hands-on machine learning with Scikit-Learn, Keras, and TensorFlow. " O'Reilly Media, Inc." 3. James, G., Witten, D., Hastie, T., & Tibshirani, R. (2021). An introduction to statistical learning: with applications in R (Vol. 2). New York: springer.
	Supplementary literature	1. M Bishop, C. (2006). Pattern recognition and machine learning.
	eResources addresses	
Example issues/ example questions/ tasks being completed	1. Analysis of Python Code Execution – U1 Analyze the provided Python code fragment and determine what its output will be for the given input data. Justify your answer by explaining the operation of the conditional statements, loops, functions, or objects used in the code. 2. Selection of a Machine Learning Method – U2 For the given transportation or logistics problem, determine which of the machine learning methods covered should be applied (e.g., regression, decision tree, SVM, k-NN, k-Means, or DBSCAN) and justify your choice with reference to the nature of the data and the objective of the analysis. 3. Interpretation of the Model Result – U3 Based on the presented output of the machine learning model, interpret the obtained result and explain its significance for the transportation or logistics problem being analyzed. Also indicate what limitations or factors may affect the reliability of the result.	
Practical activities within the subject	Not applicable	

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