University of Silesia in Katowice

1.	Field of study	Mathematics
2.	Faculty	Faculty of Science and Technology
3.	Academic year of entry	2025/2026 (winter term)
4.	Level of qualifications/degree	second-cycle studies
5.	Degree profile	general academic
6.	Mode of study	full-time

7.	General information about the module	
Module name	Machine Learning	
Module code	W4-MT-S2-25-UMa	
Number of the ECTS credits	6	
Language of instruction	Polish	
Purpose and description of the content of education	Celem modułu jest zdobycie przez studiującego wiedzy i umiejętności w zakresie następujących treści programowych: 1. Ilustrowana przykładami historia rozwoju dziedziny. 2. Uczenie maszynowe, podział na uczenie nadzorowane, nienadzorowane i uczenie ze wzmocnieniem. Pojęcie funkcji błędu, problem generalizacji, rola zbioru trenującego, testowego. Zagadnienie regresji i klasyfikacji. Dane jako punkt w wielowymiarowej przestrzeni liniowej. Przestrzeń cech. 3. Preprocessing. 4. Klasyczne metody uczenia nadzorowanego. 5. Ocena i wybór modelu. 6. Maszyny wektorów podpierających (SVM). 7. Przekleństwo wymiarowości, redukcja wymiaru przestrzeni cech, metody selekcji i ekstrakcji cech. 8. Regresja liniowa i logistyczna. 9. Uczenie nienadzorowane. 10. Drzewa decyzyjne i losowe lasy. 11. Sztuczne sieci neuronowe. Perceptron wielowarstwowy.	
List of modules that must be completed before starting this module (if necessary)	not applicable	

8.	Learning outcomes of the module			
Code	Description		Learning outcomes of the programme	Level of competenc (scale 1-5)
UMa_1	Zna i rozumie metody uczenia maszynowego		K_W04	3
			K_W05	3
UMa_2	Zna i rozumie rolę zbiorów danych (treningowych, testowych, walidacyjnych) oraz pojęcia związane z generalizacją modelu.		K_W04	3
UMa_3	Zna podstawy działania i zastosowania klasycznych algorytmów uczenia nadzorowanego		K_W04	3
UMa_4	Zna metody oceny jakości modeli predykcyjnych		K_W04	3

UMa_5	identyfikuje problemy, do których można zastosować metody uczenia maszynowego; zna ograniczenia i możliwości takiego podejścia	K_U01 K_U07	2 2
UMa_6	Potrafi dobrać odpowiedni model uczenia maszynowego do postawionego problemu, uzasadnić wybór oraz go zaimplementować.	K_U07	5
UMa_7	Umie przygotować dane do modelowania	K_U07	5
UMa_8	Potrafi zaimplementować wybrane modele ML przy użyciu bibliotek programistycznych i przeprowadzić analizę wyników	K_U07	5
UMa_9	Potrafi przeprowadzić prezentację z osiągniętych wyników	K_U09	5

9.	Methods of conducting classes	
Code	**Category**	**Name (description)**
a01	Lecture methods / expository methods	Formal lecture/ course-related lecture *a systematic course of study involving a synthetic presentation of an academic discipline; its implementation assumes a passive reception of the information provided*
a05	Lecture methods / expository methods	Explanation/clarification *explication involving the derivation of a predetermined theorem from other, already known ones, in the number of steps specified by the person teaching the course*
c07	Demonstration methods	Screen presentation *a presentation of synthetic image content using computer graphics, e.g., a series of slides or other multimedia forms, usually accompanied by a commentary; typical components of a screen presentation include text organized into bulleted points, charts, images and animations, sometimes sound effects or music; a multimedia illustration of course content presented in the form of a projected image*
d01	Programmed learning methods	Working with a computer *e.g., Webquest; implementation of educational tasks using electronic and digital devices, computer programs and Internet applications; the academic teacher acts as a consultant; students' work is carried out step by step according to the plan laid own by the person teaching the course and following his instructions, and proceeds towards producing the indicated results within the set deadline*
e01	Practical methods	Laboratory exercise / experiment *[also conducted as fieldwork] a method of practical application of knowledge; implemented in three stages: the recognition of a problem induced by the task content, the formulation of the problem and the attempt to solve it accompanied by the assessment of the effects; the goal is to acquire skills, abilities and habits, and to consolidate the acquired knowledge so that it becomes operational; the laboratory method assumes greater independence of learners than carrying out an experiment*
e04	Practical methods	Project scheduling *proceeding according to the steps proposed within a specific methodology for the completion of a task; e.g., identifying project objectives, determining the result, identifying strengths, limitations, opportunities and threats (SWOT), establishing a schedule of activities, assessing resources, establishing an implementation plan; the initial diagnosis; the reassessment of assumptions; the process of preparing the practical implementation of a project*

10.	Forms of teaching					
Code	Name	Number of hours	Assessment of the learning outcomes of the module	Learning outcomes of the module	Methods of conducting classes
01	lecture	30	exam	UMa_1, UMa_2, UMa_3, UMa_4, UMa_5, UMa_6	a01, a05, c07, e01
02	laboratory classes	30	course work	UMa_1, UMa_2, UMa_3, UMa_4, UMa_5, UMa_6, UMa_7, UMa_8, UMa_9	c07, d01, e04

11.	The student's work, apart from participation in classes, includes in particular:		
Code	Category	Name (description)	Is it part of the BUNA?
a01	Preparation for classes	Search for materials and review activities necessary for class participation *reviewing literature, documentation, tools and materials as well as the specifics of the syllabus and the range of activities indicated in it as required for full participation in classes*	Yes
a02	Preparation for classes	Literature reading / analysis of source materials *reading the literature indicated in the syllabus; reviewing, organizing, analyzing and selecting source materials to be used in class*	Yes
a03	Preparation for classes	Developing practical skills *activities involving the repetition, refinement and consolidation of practical skills, including those developed during previous classes or new skills necessary for the implementation of subsequent elements of the curriculum (as preparation for class participation)*	Yes
a04	Preparation for classes	Consulting materials complementary to those indicated in the syllabus *agreeing on materials complementary to those indicated in the syllabus, supporting the implementation of tasks resulting from or necessary for class participation*	No
b01	Consulting the curriculum and the organization of classes	Getting acquainted with the syllabus content *reading through the syllabus and getting acquainted with its content*	No
b02	Consulting the curriculum and the organization of classes	Verification / adjustment / discussion of syllabus provisions *consulting the content of the syllabus, possibly in the presence of the year tutor or members of the class group, and, if necessary, reassessing the provisions concerning special conditions for class participation, e.g., space and time requirements, technical and other requirements, including conditions for participation in classes outside the walls of the university, classes organized in blocks, organized online, etc.*	No
c01	Preparation for verification of learning outcomes	Determining the stages of task implementation contributing to the verification of learning outcomes *devising a task implementation strategy embracing the division of content, the range of activities, implementation time and/or the method(s) of obtaining the necessary materials and tools, etc.*	No
c02	Preparation for verification of learning outcomes	Studying the literature used in and the materials produced in class *exploring the studied content, inquiring, considering, assimilating, interpreting it, or organizing knowledge obtained from the literature, documentation, instructions, scenarios, etc., used in class as well as from the notes or other materials/artifacts made in class*	Yes
c03	Preparation for verification of learning outcomes	Implementation of an individual or group assignment necessary for course/phase/ examination completion *a set of activities aimed at performing an assigned task, to be executed out of class, as an obligatory*	Yes

		phase/element of the verification of the learning outcomes assigned to the course	
d01	Consulting the results of the verification of learning outcomes	Analysis of the corrective feedback provided by the academic teacher on the results of the verification of learning outcomes *reading through the academic teacher's comments, assessments and opinions on the implementation of the task aimed at checking the level of the achieved learning outcomes*	Yes

Information on the details of the module implementation in a given academic year can be found in the syllabus available in the USOS system: https://usosweb.us.edu.pl.