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

7.	**General information about the module**
Module name	**Application of Data Science and Artificial Intelligence in Domain-Specific Contexts**
Module code	W4_DSAI_S1_ZDSSIKD
Number of the ECTS credits	7
Language of instruction	
Purpose and description of the content of education	Moduł kształtuje umiejętność zastosowania Data Science i sztucznej inteligencji do rozwiązywania rzeczywistych problemów wywodzących się z różnych dyscyplin naukowych. Każdy zespół studencki otrzymuje od prowadzących inny, unikalny problem interdyscyplinarny, wymagający zapoznania się z wiedzą dziedzinową oraz przełożenia jej na język danych i modeli AI. Problemy mogą pochodzić m.in. z takich obszarów jak: matematyka, fizyka, chemia, informatyka, inżynieria materiałowa, inżynieria biomedyczna – co pozwala studentom doświadczyć pracy w nowym, nieznanym kontekście. Każda grupa współpracuje z ekspertem dziedzinowym, który prowadzi dedykowany wykład oraz warsztat, wprowadzając studentów w kontekst problemu. Następnie studenci realizują projekt pod opieką mentora. Efektem jest rozwiązanie problemu oraz jego prezentacja. Moduł realizowany jest jako niezależny komponent programu studiów w dwóch różnych semestrach. W każdym semestrze studenci pracują nad projektem z innej dyscypliny, co umożliwia rozwój umiejętności adaptacji wiedzy technicznej do różnych kontekstów dziedzinowych oraz porównywanie strategii rozwiązywania problemów. Studenci uczą się także szacowania kosztów technicznych i organizacyjnych związanych z realizacją i potencjalnym wdrożeniem zaproponowanego rozwiązania. Praca nad zróżnicowanymi problemami umożliwia pogłębione osiągnięcie efektów uczenia się w zakresie zastosowań Data Science i AI.
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)
ZDSSIKD_K01	Jest świadomy etycznych, społecznych i prawnych konsekwencji stosowania rozwiązań opartych na analizie danych i sztucznej inteligencji.	DSAI_1S_K03	3
ZDSSIKD_K02	Jest gotów współpracować z ekspertami dziedzinowymi, wykorzystując ich wiedzę specjalistyczną do właściwej interpretacji wyników uzyskanych za pomocą metod analizy danych i sztucznej inteligencji w kontekście realizowanego problemu lub projektu.	DSAI_1S_K01	3
ZDSSIKD_U01	Potrafi dobrać i krytycznie ocenić źródła wiedzy z dziedziny, w której osadzony jest realizowany projekt, dokonać analizy i syntezy pozyskanych informacji oraz zastosować je do rozwiązania problemu inżynierskiego.	DSAI_1S_U06	3
ZDSSIKD_U02	Potrafi dobrać, zaimplementować i dostosować metody i narzędzia data science oraz sztucznej inteligencji do rozwiązania problemu inżynierskiego.	DSAI_1S_U01_inż DSAI_1S_U03_inż	3 3

		DSAI_1S_U05	4
ZDSSIKD_U03	Działa odpowiedzialnie w zespole projektowym, respektując podział ról, harmonogramy i zobowiązania projektowe.	DSAI_1S_U09	3
ZDSSIKD_U04	Potrafi formułować wypowiedzi ustne i pisemne, wykorzystując właściwą terminologię specjalistyczną oraz dostosowując przekaz do kontekstu projektowego i grupy odbiorców.	DSAI_1S_U07 DSAI_1S_U08	3 3
ZDSSIKD_U05	Potrafi oszacować koszty związane z realizacją oraz potencjalnym wdrożeniem zaprojektowanego rozwiązania.	DSAI_1S_U02_inż	3
ZDSSIKD_W01	Zna pojęcia, procesy i zależności charakterystyczne dla dziedziny nauki lub techniki, w której osadzony jest realizowany projekt.	DSAI_1S_W02_inż DSAI_1S_W05	3 4
ZDSSIKD_W02	Rozumie znaczenie wiedzy dziedzinowej w rozwiązywaniu problemów z wykorzystaniem metod analizy danych i sztucznej inteligencji.	DSAI_1S_W05	4
ZDSSIKD_W03	Rozumie ograniczenia danych i kontekstu dziedzinowego w projektowaniu rozwiązań technicznych.	DSAI_1S_W02_inż DSAI_1S_W05	3 4

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*
b01	Problem-solving methods	Problem-based lecture *an analysis of a selected scientific or practical problem accompanied by its assessment and an attempt to provide a solution to the issues presented in the lecture as well as the indication of the consequences of the proposed solution*
b04	Problem-solving methods	Activating method – discussion / debate *an exchange of views supported by substantive arguments leading to a clash of different views, a compromise or the identification of common positions; it proceeds according to previously agreed-upon rules regarding the time, manner and turn-taking as well as the principles of civil discourse; a discussion is not a competition but aims at finding the best solutions or presenting different points of view; its varieties include brainstorming, Oxford-style debate, panel discussion, decision tree, conference discussion; a debate is an orderly dispute between supporters and opponents of a viewpoint, usually specialists in the field or pre-selected representatives of a group dealing with a common problem*
b05	Problem-solving methods	Activating method – seminar / proseminar *a seminar method; usually an oral presentation of a previously studied/diagnosed problem delivered on a forum; it aims at provoking a discussion concerning the results of research work; a type of conference, course or training session modelled on seminar classes*
b07	Problem-solving methods	Activating methods: a case study *a comprehensive description of a phenomenon connected with the selected discipline; reflecting the reality, presenting the 'what', 'where' and 'how' of the phenomenon, i.e., all of its key aspects to be discussed in class; used as a reproduction, presentation, discussion or diagnosis of factors that shape the phenomenon or interact with it; an in-depth qualitative analysis and evaluation of a selected phenomenon*
b08	Problem-solving methods	Activating method – peer learning

		learning through the exchange of knowledge in a group/team/pair of students, i.e., in the so-called learning cell; a kind of mutual learning; an approach focused on student activity under the guidance of the person teaching the course; a learning situation where students with a similar level of experience learn from one another
c06	Demonstration methods	Demonstration-imitation *a presentation of a model way of performing specific activities accompanied by a commentary; it aims at triggering imitation activities in an individual or in a group of participants observing the activities of the person teaching the course until the right habit is formed through regular exercise; the demonstration-imitation method is combined with a physical practice of activities/behaviours*
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*
d02	Programmed learning methods	Working with a programmed textbook *working with a textbook containing instructional material covering part of or the entire curriculum of the module as well as a formula for studying the content; includes working with a subject textbook, an atlas, a catalogue, a problem book, etc.*
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*
f01	Methods of self-learning	Self-education *a method which involves independent acquisition of knowledge, skills and social competences, extending their scope and quality; complementary to the learning process taking place in class; taking on the task of developing and adjusting qualifications on one's own; self-study*
f02	Methods of self-learning	Individual work with a text *searching for and acquiring new information using textbooks and other written sources (including their digital versions); searching for texts, selecting fragments for analysis/interpretation, using other texts to solve a problem related to the studied issue*

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
fs01	lecture	15	course work	ZDSSIKD_W01, ZDSSIKD_W02, ZDSSIKD_W03	a01, b01, b04
fs02	laboratory classes	30	course work	ZDSSIKD_K02, ZDSSIKD_U01, ZDSSIKD_U02, ZDSSIKD_U04	a05, b04, b07, b08, c06, c07, d01, d02, e01, f01
fs03	laboratory classes	60	course work	ZDSSIKD_K02, ZDSSIKD_U02, ZDSSIKD_U03, ZDSSIKD_U05	a05, b04, b07, b08, c06, c07, d01, d02, e01, f01, f02
fs04	seminar	15	course work	ZDSSIKD_K01, ZDSSIKD_U04	b04, b05, c07

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*	No
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)*	No
a05	Preparation for classes	Production/preparation of tools, materials or documentation necessary for class participation *developing, preparing and assessing the usefulness of tools and materials (e.g. aids, scenarios, research tools, equipment, etc.) to be employed in class or as an aid when preparing for classes*	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
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*	No
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 phase/element of the verification of the learning outcomes assigned to the course*	No
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
d02	Consulting the results of the verification of learning outcomes	Development of a corrective action plan as well as supplementary/corrective tasks *reviewing and selecting tasks and activities enabling the elimination of errors indicated by the academic*	Yes

		teacher, their verification or correction resulting in completing the task with at least the minimum passing grade	

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.