1.	**Field of study**	**Applied Computer Science**
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		**Computer Architecture**
Module code		W4-IS-S1-AK
Number of the ECTS credits		5
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 kształcenia: 1. Podstawowe pojęcia i kamienie milowe architektury komputerów, wielopoziomowa struktura systemów komputerowych, przykłady współczesnych systemów. 2. Organizacja systemów komputerowych: procesory, pamięć operacyjna, pamięć masowa, urządzenia wejścia/wyjścia. 3. Poziom układów logicznych: układy logiczne, elementy układów pamięci, elementy układów procesora i połączeń wewnątrz systemowych, interfejs wejścia/wyjścia, przykłady. 4. Poziom mikroarchitektury: ścieżka danych procesora, mikrorozkazy, sterowanie na poziomie mikrorozkazów, reguły projektowe i przykłady. 5. Poziom konwencjonalnej listy rozkazów: przegląd ogólny, typy danych i formaty rozkazów, adresowanie, typy rozkazów, sterowanie wykonaniem ciągu rozkazów, przykłady. 6. Poziom systemu operacyjnego: pamięć wirtualna, wirtualne rozkazy wejścia/wyjścia, wirtualne rozkazy dla przetwarzania równoległego, przykłady. 7. Poziom języka asemblera: wprowadzenie do programowania w języku asemblera, makra, biblioteki i inne środki pomocnicze, proces asemblacji i asemblery, konsolidacja modułów i rozmieszczanie w pamięci. 8.Architektury systemów równoległych: wielowątkowość na poziomie układu, procesory wielordzeniowe
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)
IS-S1-AK_1	zna strukturę i organizację typowych systemów komputerowych	IS1_W03	5
IS-S1-AK_2	zna i rozumie koncepcję „konwencjonalnej maszyny" w architekturze systemu komputerowego oraz jej znaczenie dla rozwoju sprzętu i oprogramowania	IS1_W03	4
IS-S1-AK_3	zna metody realizacji przetwarzania sekwencyjnego oraz równoległego w systemach komputerowych	IS1_W03	4
IS-S1-AK_4	potrafi wskazać i oszacować czynniki wpływające na funkcjonalność oraz wydajność danego systemu komputerowego	IS1_U07	4
IS-S1-AK_5	posiada umiejętności w zakresie programowania niskopoziomowego		

		IS1_U05	3
IS-S1-AK_6	rozumie potrzebę śledzenia postępów w rozwoju systemów komputerowych i docenia znaczenie ustawicznego uaktualniania swojej wiedzy i umiejętności	IS1_K01	3
		IS1_K03	2

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*
a03	Lecture methods / expository methods	**Description** *a description of objects, phenomena, processes or people; it involves specifying the structure and characteristic features of the object, phenomenon, or process being described; it is usually accompanied by a demonstration of the described object or by its models, drawings, tables, charts, etc.; a description may take the form of an explanation, classification, justification or comparison*
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*
b02	Problem-solving methods	**Lecture-discussion** *transmission of content involving interaction with the lecture audience; discussion of lecture-related issues is one of its elements or constitutes its follow-up*
b09	Problem-solving methods	**Activating method – flipped classroom** *anticipatory learning; work in class is based on previously studied material indicated by the person teaching the course; preparation outside the classroom serves the purpose of getting familiar with the issues whose knowledge is necessary for participating in the in-class discussion and the training in the related practical skills; the activity is based on the work of students under the guidance of 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*
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
IS-S1-AK_fs_1	lecture	30	exam	IS-S1-AK_1, IS-S1-AK_2, IS-S1-AK_3	a01, b01, b02, c07, f01, f02
IS-S1-AK_fs_2	laboratory classes	30	course work	IS-S1-AK_4, IS-S1-AK_5, IS-S1-AK_6	a03, b09, d01, e01, f01, f02

11.	The student's work, apart from participation in classes, includes in particular:		

Code	Category	Name (description)	Is it part of the BUNA?
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
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*	Yes
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.*	Yes
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
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 teacher, their verification or correction resulting in completing the task with at least the minimum passing grade*	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.