1.	**Field of study**	**Applied Computer Science**
2.	Faculty	Faculty of Science and Technology
3.	Academic year of entry	2023/2024 (winter term), 2024/2025 (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 Graphics and Image Processing**
Module code	W4-IS-S1-GKPO
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 definicje stosowane w grafice komputerowej. 2.Budowa ludzkiego oka, percepcja obrazu przez człowieka. 3.Systemy grafiki. Sprzęt i oprogramowanie dla potrzeb grafiki komputerowej. Graficzne interfejsy użytkownika. 4.Formaty plików w grafice komputerowej. Metody kompresji obrazu. 5.Przestrzenie (modele) barw w grafice komputerowej. 6.Prymitywy graficzne. Algorytmy rysowania w rastrowej grafice dwuwymiarowej. 7.Podstawowe przekształcenia 2D i 3D. Składanie przekształceń 2D i 3D. 8.Reprezentacja przestrzeni trójwymiarowej na płaszczyźnie – rzutowanie. 9.Modelowanie krzywych. Krzywe parametryczne trzeciego stopnia (krzywe Beziera). 10.Podstawy modelowania obiektów dwu- i trójwymiarowych. 11.Przetwarzanie obrazów. 12.Modele cieniowania/oświetlenia, koloru i tekstury. 13.Metoda śledzenia promieni. Modele cieniowania bazujące na fizyce (PBR). 14.Wprowadzenie do animacji. 15.Wprowadzenie do graficznych interfejsów programowania aplikacji (OpenGL, DirectX).
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-GKPO_1	zna i rozumie podstawowe pojęcia dotyczące grafiki komputerowej: rastrowej i wektorowej	IS1_W03	3
IS-S1-GKPO_2	zna i rozumie funkcjonowanie nowoczesnych rozwiązań sprzętowych dla grafiki komputerowej	IS1_W03	3
IS-S1-GKPO	zna podstawowe operacje i algorytmy rastrowe w grafice dwuwymiarowej oraz przekształcenia geometryczne 2D i 3D	IS1_W03	3

_3			
IS-S1-GKPO_4	zna i potrafi zastosować podstawowe techniki i algorytmy przetwarzania obrazu	IS1_U05 IS1_W03	3 3
IS-S1-GKPO_5	potrafi dobrać odpowiednie narzędzia programistyczne oraz zastosować efektywne metody do tworzenia różnorodnych projektów graficznych	IS1_U05 IS1_U06	4 3
IS-S1-GKPO_6	potrafi modelować proste obiekty trójwymiarowe, wykonywać podstawowe animację oraz przygotowywać fotorealistyczne grafiki wyjściowe	IS1_U05 IS1_U06	3 4
IS-S1-GKPO_7	potrafi samodzielnie zdobywać wiedzę w celu podnoszenia kompetencji zawodowych	IS1_U01	3
IS-S1-GKPO_8	rozumie potrzebę i jest gotów do ciągłego dokształcania się w zakresie sprzętu i oprogramowania dla grafiki komputerowej	IS1_K01	3

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*
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*
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*
f03	Methods of self-learning	Conceptual work *a (mainly intellectual) activity carried out independently (or in a selected group) resulting in the creation of a concept, idea or project; creating a plan based on a vision; developing a general outline of a project; producing a simplified sketch of the variant versions of a procedure/product/work*

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-GKPO_fs_1	lecture	30	exam	IS-S1-GKPO_1, IS-S1-GKPO_2, IS-S1-GKPO_3, IS-S1-GKPO_4	a01, b01, b02, c07, f01, f02
IS-S1-GKPO_fs_2	laboratory classes	30	course work	IS-S1-GKPO_5, IS-S1-GKPO_6, IS-S1-GKPO_7, IS-S1-GKPO_8	a03, b09, d01, e01, e04, f01, f02, f03

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
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*	Yes
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.