SYLLABUS

Name: ***Computer Graphics (MakAu>SI6CG19)***
Name in Polish:
Name in English: ***Computer Graphics***

Information on course:

Course offered by department: Faculty of Automatic Control, Electronics and Computer Science
Course for department: Silesian University of Technology

Default type of course examination report:

ZAL

Language:

English

Course homepage:

https://platforma2.polsl.pl/rau2/course/view.php?id=400

Short description:

The course aims to provide the theoretical basis of 3D computer graphics algorithms, and selected topics of 2D computer graphics as well as providing the necessary practical experience acquired as a result of the implementation of algorithms in the laboratory exercises. The lecture will enable students to get in touch with modern solutions in the field of photo-realistic and interactive 3D graphics offered in world literature. The main idea is to understand the rendering pipeline realized by graphics cards as a basic abstraction in computer graphics. The course will provide the basic skills in the programming of OpenGL API with the usage of a programmable pipeline in GLSL.

Description:

1) Lectures:
Introduction to programming in graphical API based on OpenGL, graphical pipeline, programming shaders in GLSL. Basic math. Affine transformation. Rotation representation (Euler angles, quaternion). Clipping. Projection. Hidden surface removal. Rasterization. Geometric modeling (implicit, parametric, surface meshes, volumetric, LOD). Texturing. Light modeling.
2) Laboratory:
Introduction. Raster algorithms. Color. 3D Transformations. Hidden surface removal. Illumination models. Raytracing. Bone animation, Collision detection, Particle effects, Pixel, and vertex shaders. Introduction in Unity programming. Animation.

Prerequisites and additional requirements, taking into account the course sequence:
Computer Programming (C, C++), Algebra and Analytic Geometry, Fundamentals of computer programming.

Number of ECTS credits (according to the study program): 3.

Lecture – 30h
Laboratory – 30h
Student's own work: preparation for classes 15h
Total hours: 75h (contact 60h/individual work 15h)
Language: English

Bibliography:

[1] Andries van Dam, Morgan McGuire, David F. Sklar, James D. Foley, Steven K. Feiner, Kurt Akeley Computer Graphics: Principles and Practice (3rd Edition), 2013.
[2] A series of books: Graphics Gems
[3] Francis S Hill Jr., Stephen M Kelley: Computer Graphics Using OpenGL (3rd Edition).
[4] Sumanta Guha: Computer Graphics Through OpenGL: From Theory to Experiments,
[5] Richard S. Wright Jr., Benjamin Lipchak: OpenGL. Księga eksperta. Helion
[6] OpenGL Programming Guide

Learning outcomes:

K1A_W09, K1A_W13, , K1A_W22 Student is aware of basic computer graphics algorithms.
K1A_W09, K1A_W13, , K1A_W22 Knowledge of basic methods used in solving computer science tasks in the field of computer graphics algorithms.
K1A_W09, K1A_W13, , K1A_W22 Students understand the graphical pipeline.
K1A_U21, K1A_U22 Students can solve problems related to 2D and 3D computer graphics.
K1A_U21, K1A_U22 Students can implement basics 2D and 3D graphics algorithms.

Assessment methods and assessment criteria:

Completion of the subject based on lecture tests (required to score 50 points out of 90).
Final grade based on grades from laboratory exercises. Passing each exercise is required. In the event of absence, the deadline for making up work is agreed upon with the laboratory teacher.

The syllabus is valid from the academic year 2024/2025, and its content is not subject to change during the semester.

Course credits in various terms:

<without a specific program>

Type of credits	Number	First term	Last term
European Credit Transfer System (ECTS)	3	2021/2022-L	