#### card of course

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| Subject name | 3D graphics general part 2 |

1. The placement of the subject in the study system

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| 1.1. Field of study | Computer science |
| 1.2. Form and path of study | Full-time/Part-time |
| 1.3. Level of education | First-cycle studies |
| 1.4. Study profile | Practical |

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| 1. 5. Specialty | Computer graphics and game design |
| 1.6. Subject Coordinator | Mgr inż. Michał Brogowski |

2. General characteristics of the subject

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| 2.1. Belonging to a subject group | Optional/practical |
| 2.2. Number of ECTS | 5 |
| 2.3. Language of lectures | English |
| 2.4. Semesters in which the subject is taught | IV |
| 2.5.Criteria for selecting course participants | For specializations: Computer graphics and game design |

1. Learning outcomes and course delivery
   1. Subject Objectives

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| No. | Subject Objectives |
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| C1 | Learning advanced concepts in 3D graphics |
| C2 | Learning advanced techniques for working in 3D graphics programs |
| C3 | Learning advanced techniques for creating 3D graphics, animations and visualizations |

* 1. Subject-specific learning outcomes, divided into knowledge , skills and competences , with reference to the directional learning outcomes

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| --- | --- | --- | --- | --- | --- | --- |
| No. | Description of subject  learning outcomes | Reference to  directional effects  learning (symbols) | Method of implementation (mark "X") | | | |
| ST | | NST | |
| Classes at the University | Activities on  the platform | Classes at the University | Activities on  the platform |
| After passing the course, the student knows and understands **the knowledge** | | | | | | |
| W1 | What are Blender Physics Simulations? | INF\_W09 |  | X |  | X |
| W2 | How to Texturize 3D Models with Advanced PBR Techniques |  | X |  | X |
| W3 | What are 'render passes' and how to use them |  | X |  | X |
| W4 | What are 3D graphics rendering engines? |  | X |  | X |
| W5 | How to set render parameters like camera and lights |  | X |  | X |
| After passing the course, the student is **able** to: | | | | | | |
| U1 | Use physical simulations (e.g. cloth, particles, force fields, rigid body) to model scenes with high levels of detail | INF\_U03  INF\_U12 | X |  | X |  |
| U2 | Texture 3d models with advanced PBR techniques (using Albedo, Roughness, Metallic, Normal maps etc.) | X |  | X |  |
| U3 | Use advanced scene lighting techniques (HDRI maps) | X |  | X |  |
| U4 | Render scenes into 'render passes' for further post-production processing | X |  | X |  |
| U5 | Perform advanced graphic processing of render passes | X |  | X |  |
| U6 | Combine 3D and 2D graphic elements (e.g. a 3D illustration used as a background for a magazine cover) | X |  | X |  |
| U7 | Create 3D animations with object and camera movement | X |  | X |  |
| After completing the course, the student is ready to take part in **social competences.** | | | | | | |
| K1 | Preparing commissioned projects in the field of 3D graphics and presenting them in a social environment. | INF\_K06 | X |  | X |  |

3.3. Forms of teaching and their number of hours - Full-time studies (ST), Part-time studies (NST)

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| Path | Lecture | Exercises | Design | Workshop | Laboratory | Seminar | Lecturer | Classes conducted using distance learning methods and techniques in the form of a lecture. | Other | **ECTS points** |
| **ST** |  |  |  |  | 30 |  |  | 20 |  | 5 |
| **NST** |  |  |  |  | 20 |  |  | 10 |  | 5 |

3.4. Content of education (separately for each form of classes: (W, ĆW, PROJ, WAR, LAB, LEK, OTHER). It should be marked (X) how the given content will be implemented (classes at the university or classes on the e-learning platform conducted using distance learning methods and techniques)

TYPE OF CLASS: LECTURE

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| --- | --- | --- | --- | --- | --- | --- |
| No. | Content of the course | Reference to subject-specific learning outcomes | Method of implementation (mark "X") | | | |
| ST | | NST | |
| **Classes at the University** | **Activities on  the platform** | **Classes at the University** | **Activities on  the platform** |
| 1. | Fundamentals of Physics Simulation Systems in Blender | W1 |  | X |  | X |
| 2. | Advanced texturing techniques (tiled texture, procedural textures) | W2 |  | X |  | X |
| 3. | Advanced scene lighting techniques (HDRI, Light groups), creating and using HDRI | W3 |  | X |  | X |
| 4. | Advanced rendering techniques (layer pass, compositor) | W4 |  | X |  | X |
| 5. | Animation Basics (Keyframes, Timeline, Graph Editor) | W5 |  | X |  | X |
| 6. | Summary of classes and discussion of grades. |  |  | X |  | X |

TYPE OF CLASS: LABORATORY

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| No. | Content of the course | Reference to subject-specific learning outcomes | Method of implementation (mark "X") | | | |
| ST | | NST | |
| **Classes at the University** | **Activities on  the platform** | **Classes at the University** | **Activities on  the platform** |
| 1. | Exercises in the use of physics simulations | U1, K2 | X |  | X |  |
| 2. | Advanced PBR Material Creation Exercises | U2, K2 | X |  | X |  |
| 3. | Exercises in creating and using advanced HDRI lighting; Types of lights, groups of lights, advanced camera setup techniques | U3, K2 | X |  | X |  |
| 4. | Exercises in rendering 3d scenes using layer passes (Normal, Ambient occlusion etc.); Layer pass composing techniques in Compositor | U4, U5, U6, U7, K2 | X |  | X |  |
| 5. | Exercises in creating simple camera and object animations; rigging basics | U5, K2 | X |  | X |  |
| 6. | Summary of classes and discussion of grades. Presentation and defense of projects | K1 | X |  | X |  |

3.5 . Methods of verifying learning outcomes (indication and description of methods of conducting classes and verification of achievement of learning outcomes and method of documentation)

LECTURE – The lecture is an informative introduction to the student's own work in the laboratory. The laboratories and lectures are thematically linked so that the student can use the knowledge from the lecture in creating a semester project.

Assessment of lectures in the form of a 10-question test, single choice, each question worth 2 points.

Grade 3 (sufficient): 11 – 12 points

Grade 3.5 (sufficient plus): 13 – 14 points

Rating 4 (good): 15 – 16 points

Rating 4.5 (good plus) 17 – 18 points

Rating 5 (very good): 19 – 20 points

LABORATORY – The lab starts with work on a semester project that must be defended at the last meeting. The project is to create a 3D scene and a final render according to the instructor's guidelines. The student must present how they built the scene, show the techniques and tools used, create lighting, render and post-production.

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| Subject Effects | Teaching methods | Methods of verifying learning outcomes | Documentation methods |
| KNOWLEDGE | | | |
| W1-W5 | Lectures – detailed description of work techniques in the form of lectures | Grading in the form of a test | Test results collected on the PUW platform |
| SKILLS | | | |
| U1-U7 | Laboratories – working on a semester project in the computer lab | Preparation and defense of the semester project (described above) | Projects in the form of renders collected on the PUW platform |
| SOCIAL COMPETENCES | | | |
| K1-K2 | Laboratories – working on a semester project in the computer lab | Preparation and defense of the semester project (described above) | Projects in the form of renders collected on the PUW platform |

3.6. Assessment criteria for the achieved learning outcomes

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| Learning effect | For a grade of 3 or "pass."  the student knows and understands/is able to/is ready to | For a grade of 3.5, the student knows and understands/is able to/is ready to | For a grade of 4, the student knows and understands/is able to/is ready to | For a grade of 4.5, the student knows and understands/is able to/is ready to | For a grade of 5, the student knows and understands/is able to/is ready to |
| W | 51-60% of knowledge indicated in learning outcomes | 61-70% of knowledge indicated in learning outcomes | 71-80% of knowledge indicated in learning outcomes | 81-90% of knowledge indicated in learning outcomes | 91-100% of knowledge indicated in learning outcomes |
| U | 51-60% of skills indicated in learning outcomes | 61-70% of skills indicated in learning outcomes | 71-80% of skills indicated in learning outcomes | 81-90% of skills indicated in learning outcomes | 91-100% of skills indicated in learning outcomes |
| K | 51-60% of skills indicated in learning outcomes | 61-70% of skills indicated in learning outcomes | 71-80% of skills indicated in learning outcomes | 81-90% of skills indicated in learning outcomes | 91-100% of skills indicated in learning outcomes |

3.7. Literature

**Basic**

[**https://docs.blender.org/manual/en/latest/**](https://docs.blender.org/manual/en/latest/)

**Supplementary:**

[**https://www.cgchannel.com**](https://www.cgchannel.com) **– CG Channel Magazine**

[**https://www.cgw.com**](https://www.cgw.com) **– CGW Magazine**

[**https://blenderartists.org**](https://blenderartists.org) **– Forum użytkowników Blendera**

[**https://max3d.pl**](https://max3d.pl) **– Magazyn 3D**

4. Student workload - ECTS points balance

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| **Types of student activity** | **Student Load** | |
| **ST** | **NST** |
| **Classes requiring direct contact between the student and the academic teacher at the university premises** | **50** | **30** |
| Classes included in the study plan | 50 | 30 |
| **Student's own work** | **75** | **95** |
| Ongoing preparation for classes, preparation of project work/presentations/etc. | 40 | 50 |
| Preparation for passing classes | 35 | 45 |
| **TOTAL STUDENT HOURLY LOAD** | **125** | **125** |
| **Number of ECTS points** | **5** | **5** |

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| Last change date | 30/09/2024 |
| The changes were introduced | INF Education Quality Team |
| The changes were approved | Arkadiusz Gwarda, M.A. |