#### card of course

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| Subject name | 3D graphics for games part 1 |

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 Robert Miedziocha |

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 to create 3D models with textures for computer games. |
| C2 | Learning to optimize 3D models used in computer games. |
| C3 | Learning how to export and import assets to external game engines using Unity 3d as an example |

* 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 | Knows the most important rules and best practices necessary when working with 3D graphics for computer games | INF\_W09 |  | X |  | X |
| W2 | Understands what the Sculpting process is and knows the tools necessary to perform Sculpting correctly |  | X |  | X |
| W3 | Knows what the Retopology process is |  | X |  | X |
| W4 | Knows and understands the rules of exporting and importing models to an external game engine, with particular emphasis on Unity 3d |  | X |  | X |
| W5 | Knows what the UV Unwrapping process is for models used in computer games |  | X |  | X |
| W6 | Knows and understands the process of texture baking, with particular emphasis on Adobe Substance Painter |  | X |  | X |
| After passing the course, the student is **able** to: | | | | | | |
| U1 | Based on references, he can create an accurate 3D model (Hi poly) using Sculpting tools. | INF\_U12 | X |  | X |  |
| U2 | Carry out the retopology process based on the Hi-poly model you have made – resulting in a simplified Low Poly model | X |  | X |  |
| U3 | Smoothly uses Remesh tools | X |  | X |  |
| U4 | Can use advanced mesh editing techniques in Blender. | X |  | X |  |
| U5 | Can correctly unfold the mesh of the Low Poly model - UV Unwrapping | X |  | X |  |
| U6 | Can bake textures correctly in Substance Painter | X |  | X |  |
| After completing the course, the student is ready to take part in **social competences.** | | | | | | |
| K1 | find reference materials (photos, plans, conceptual drawings) and create your own 3D models based on them | INF\_K03 | X |  | X |  |
| K2 | Make necessary changes and corrections to the developed models in order to improve their quality | 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** |  |  |  |  | 15 |  |  | 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. | Rules for working with models used in computer games | W1, W4 |  | X |  | X |
| 2. | Good practices and the most important principles of optimizing models for computer games. | W1, W4 |  | X |  | X |
| 3. | Tools used in editing complex 3d models – Hi Poly, Sculpting | W2 |  | X |  | X |
| 4. | Retopology Tools | W3 |  | X |  | X |
| 5. | UV Unwrapping, Texture Burning in Adobe Substance Painter | W4, W5, W6 |  | 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 – Sculpting in Blender | U1, U3, U4, K1, K2 | X |  | X |  |
| 2. | Tutorials - Retopology in Blender | U2, K1, K2 | X |  | X |  |
| 3. | Tutorials – Baking Textures in Adobe Substance Painter | U6, K2, K2 | X |  | X |  |
| 4. | UV Unwrapping Tutorials in Blender | U5, K1, K2 | X |  | X |  |
| 5. | Summary of classes and discussion of grades. Presentation of works. |  | 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 will present the tools and techniques necessary to prepare a 3D model for computer games. The individual stages will be presented during practical work with the 3D model. All stages will include: Preparation of Base mesh with the Remesh tool, Sculpting with a presentation of the most important Brushes, retopology, UV unwrapping. Texture baking will be performed with Adobe Substance Painter. The knowledge provided during the lectures is necessary for students to be able to work on their own models during the exercises.

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 – During the laboratory, students supported by the teacher will carry out each step of the process leading to obtaining an optimized 3d model with baked textures (Normal, AO, Cavity). As a credit assignment, students must independently make a Hi-poly model, perform retopology, correctly perform the UV Unwrapping process, and independently bake textures (Normal Map, AO, Cavity, Curvature) in Adobe Substance Painter. The completed works will be discussed with students during the last class, then assessed.

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| Subject Effects | Teaching methods | Methods of verifying learning outcomes | Documentation methods |
| KNOWLEDGE | | | |
| W1-W6 | Lectures – detailed description of work techniques in the form of lectures on the PUW platform | Grading in the form of a test | Test results collected on the PUW platform |
| SKILLS | | | |
| U1-U6 | Laboratories – exercises in the workshop | Assessment paper to be assessed (description above) | Project in the form of documentation (screenshot of the Hipoly model) and low poly model + burnt textures archived on the PUW platform |
| SOCIAL COMPETENCES | | | |
| K1-K2 | Laboratories – exercises in the workshop | Assessment paper to be assessed (description above) | Project in the form of documentation (screenshot of the Hipoly model) and low poly model + burnt textures archived 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**

1. [**https://docs.blender.org/manual/en/latest/**](https://docs.blender.org/manual/en/latest/)
2. [**https://www.youtube.com/watch?v=4kNBgTLy-Ok&ab\_channel=Agust%C3%ADnH%C3%B6nnun**](https://www.youtube.com/watch?v=4kNBgTLy-Ok&ab_channel=AgustínHönnun)
3. [**https://www.youtube.com/watch?v=8Q7zHNK1ByA&ab\_channel=JonnyShields**](https://www.youtube.com/watch?v=8Q7zHNK1ByA&ab_channel=JonnyShields)
4. **https://www.youtube.com/watch?v=X2GNyEUvpD4&ab\_channel=CGBoost**

**Supplementary:**

1. Wprowadzenie do projektowania przestrzennego. Zasady, procesy i projekty, Kimberly Elam
2. Kompozycja w sztuce cyfrowej.Podstawy. Simon Genew

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** | **25** |
| Classes included in the study plan | 50 | 25 |
| **Student's own work** | **75** | **100** |
| Ongoing preparation for classes, preparation of project work/presentations/etc. | 40 | 50 |
| Preparation for passing classes | 35 | 50 |
| **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. |