#### card of course

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| Subject name | 3D graphics for games 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 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 | V |
| 2.5.Criteria for selecting course participants | For specialization: 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 | Developing skills in creating 3D models with textures for computer games. |
| C2 | Learning to create realistic materials in Adobe Substance Painter. |
| C3 | Learning how to use the Unity 3d game engine |

* 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 and understands the process of creating realistic materials in Adobe Substance Painter | INF\_W09 |  | X |  | X |
| W2 | Knows the principles of working with modular assets. |  | X |  | X |
| W3 | He knows what the technique of preparing Trim sheet textures is |  | X |  | X |
| W4 | Knows and understands the Unity 3d engine interface, knows the basic functions and tools of the engine |  | X |  | X |
| W5 | Understands the principle of real-time lights and what the Light Baking process is |  | X |  | X |
| W6 | Knows and understands graphics optimization techniques in the Unity 3d engine |  | X |  | X |
| W7 | Knows what postprocessing is in Unity |  | X |  | X |
| After passing the course, the student is **able** to: | | | | | | |
| U1 | Can make realistic material in Adobe Substance Painter | INF\_U12 | X |  | X |  |
| U2 | Can create hand-painted textures directly on the model in Substance Painter | X |  | X |  |
| U3 | Can export final texture sets to an external game engine, and create materials in that engine | X |  | X |  |
| U4 | Can smoothly manage a scene in Unity 3d, deploy assets, create prefabs | X |  | X |  |
| U5 | It can light the stage and burn the lighting – Light Baking | X |  | X |  |
| U6 | Can use Global Volume and Local Volume objects in Unity and prepare various postprocessing profiles | X |  | X |  |
| After completing the course, the student is ready to take part in **social competences.** | | | | | | |
| K1 | Adapt to specific design conditions and requirements and maintain aesthetics and high quality of work | 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** |  |  |  |  | 40 |  |  | 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. | Tools and their use in Adobe Substance Painter | W1 |  | X |  | X |
| 2. | The most important techniques for optimizing graphics in the Unity 3d engine | W5, W6 |  | X |  | X |
| 3. | Rules and steps for preparing a Trim Sheet texture | W3 |  | X |  | X |
| 4. | Rules and steps for creating modular assets using Trim Sheet textures | W2 |  | X |  | X |
| 5. | The interface and basic functions and tools of the Unity 3d game engine | W4, W7 |  | 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. | Tutorials – Creating Realistic Materials in Adobe Substance Painter | U1, K1 | X |  | X |  |
| 2. | Tutorials – Hand Painting Textures in Adobe Substance Painter | U2, K1 | X |  | X |  |
| 3. | Exercises – exporting textures to Unity 3d and configuring materials in the engine | U3, U4, K1 | X |  | X |  |
| 4. | Exercise - Baking Lightmaps in Unity | U5, U6, K1 | X |  | X |  |
| 5. | Summary of classes and discussion of grades. |  | 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 realistic material in Adobe Substance Painter, and discuss the principles of exporting textures to an external engine. The principles of working with modular assets for computer games will be discussed, then the process of making a Trim Sheet texture will be presented. The Unity 3d engine interface will be presented and the most important functions and tools will be discussed. Students will become familiar with the process of burning lighting (LightBaking) and learn the basic techniques of graphics optimization in Unity. Familiarization and assimilation of the knowledge provided in the lectures is necessary to complete the tasks in 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 work on a set of modular assets, which they will texture with a Trim Sheet type material. They will complete all the stages needed to make an asset: preparing hi-poly sculpting for a Trim type texture, preparing a realistic material in Substance Painter, exporting textures, making a set of modular assets using exported textures, exporting ready models to Unity, building and lighting a scene in Unity using the provided assets. To pass the course, students will independently make a set of modular assets. The task will be divided into stages, each stage is subject to assessment.

The stages assessed are:

1. Preparing a Trim Sheet Texture Set
2. Modeling and texturing a set of modular assets using a previously created Trim texture
3. Building a scene from the modular assets made in Unity. The scene should be lit.

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| Subject Effects | Teaching methods | Methods of verifying learning outcomes | Documentation methods |
| KNOWLEDGE | | | |
| W1-W7 | Lectures – detailed description of work techniques in the form of lectures on the PUW platform | Test-based exam | 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**

**https://www.youtube.com/watch?v=CarefswACgs&t=1s&ab\_channel=PolygonAcademy**

[**https://www.youtube.com/watch?v=uUJShalzWy8&ab\_channel=FlippedNormalsMarketplace**](https://www.youtube.com/watch?v=uUJShalzWy8&ab_channel=FlippedNormalsMarketplace)

[**https://www.youtube.com/watch?v=IlyKPcKKKxI&ab\_channel=kobusviljoen**](https://www.youtube.com/watch?v=IlyKPcKKKxI&ab_channel=kobusviljoen)

[**https://www.youtube.com/watch?v=2Kzo68liq78&ab\_channel=Jens**](https://www.youtube.com/watch?v=2Kzo68liq78&ab_channel=Jens)

**https://www.youtube.com/watch?v=KFEb51rinwI&list=PLQk3p-aJsSWTKKmuFwnzEVaf3ovKIg1jx&ab\_channel=LMHPOLY**

**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** | **60** | **30** |
| Classes included in the study plan | 60 | 30 |
| **Student's own work** | **65** | **95** |
| Ongoing preparation for classes, preparation of project work/presentations/etc. | 35 | 50 |
| Preparation for passing classes | 30 | 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. |