# MODULE/ COURSE FORM

## A. general information

<table>
<tr><td rowspan="10">To be completed by Course Team</td><td colspan="5">Module name :<br>**GRAPHICS AND COMPUTER GAMES ENGINES**</td><td colspan="2">Module code: M13</td></tr>
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<tr><td colspan="7">Faculty:<br>**INSTITUTE OF APPLIED INFORMATICS**</td></tr>
<tr><td colspan="4">Field of study:<br>**INFORMATICS**</td><td colspan="3">Level of education:<br>**first**</td></tr>
<tr><td colspan="2">Mode of study :<br>**Full-time**</td><td colspan="2">Learning profile:<br>**Practical**</td><td colspan="3">Speciality::</td></tr>
<tr><td colspan="2">Year/ semester:<br>**2/3**</td><td colspan="3">Module/ course status::</td><td colspan="2">Module/ course language:<br>**Polish/English**</td></tr>
<tr><td>Type of classes</td><td>lecture</td><td>lessons</td><td>lab</td><td>project</td><td>Tutorial</td><td>other (please specify)</td></tr>
<tr><td>Course load</td><td>**15**</td><td></td><td>**30**</td><td></td><td></td><td></td></tr>
<tr><td colspan="2">Module/ course objectives</td><td colspan="5">Learning the basic uses of graphic engines, skillful use of the Unreal Engine software environment. Creating your own projects in the form of games as well as real-time visualization. Acquiring the ability to use Virtual Reality in the design of games and architectural visualizations. Professional use of software for 3D graphics, modeling and creating three-dimensional scenery. Use of skills acquired in previous semesters in graphic projects.</td></tr>
<tr><td colspan="2">Entry requirements</td><td colspan="5">Good knowledge of 3d software, the ability to model and texturing three-dimensional objects. Basic knowledge of technical drawing and perspective principles.</td></tr>
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### LEARNING OUTCOME

| Nr | LEARNING OUTCOME DESCRIPTION | Learning outcome reference |
|---|---|---|
| | **Knowledge - student**: | |
| 01 | has knowledge of general computer science and computer graphics | K_W05 |
| 02 | knows the basic methods of modeling, lighting and texturing 3d | K_W15 |
| 03 | knows the basic principles of building a computer game | K_W06 |
| | **Skills – student:** | |
| 04 | supports professional audio video equipment, virtual reality tools | K_U01, K_U06, K_U22 |
| 05 | performs a specific project creating computer animations using a graphics engine | K_U20 |
| 06 | performs a specific project based on the possibilities of virtual reality | K_U20 |
| | **Social competence – student:** | |
| 07 | is aware of the need to raise the level of knowledge in the field of computer graphics | K_K01 |
| 08 | cooperates in a group using social tools | K_K07 |

| Assessment method | Learning outcome number |
|---|---|
| Solving tasks, tasks related to a specific project topic, analyzing the assumptions and capabilities of the software | 04, 05 |
| Practical project for implementation in project groups, the ability to choose the form of the project, project type, task execution technology | 01, 02,03, 04, 05, 06, 07, 08 |
| Discussion on the feasibility of projects, another approach to known design methods. | 06 |

### STUDENT WORKLOAD

| | Number of hours | |
|---|---|---|
| | In all | including practical |
| Participation in lectures | 15 | 9 |
| Independent study of lecture topics | 15 | 9 |
| Participation in tutorials, labs, projects and seminars | 30 | 30 |
| Independent preparation for tutorials* | 30 | 30 |
| Preparation of projects/essays/etc. * | 10 | 10 |
| Preparation/ independent study for exams | | |
| Participation during consultation hours | 2 | |
| Other | | |
| **TOTAL student workload in hours** | 102 | 88 |
| **Number of ECTS credit per course unit** | **4 ECTS** | |
| Number of ECTS credit associated with practical classes | **3,5 ECTS** | |
| Number of ECTS for classes that require direct participation of professors | **1,8 ECTS** | |

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| Module/ course coordinator | **mgr inż. Wiesław Gerej** |
|---|---|
| Lecturer | **dr inż. Jacek Paluszak, mgr inż. Wiesław Gerej** |

## CURRICULUM CONTENTS

### Lecture

a) the use of computer graphics for the purposes of visualization of technological processes in terms of CAD and CAM software

b) computer graphics as a information carrier in engineering applications, methods of visualization

c) analyzing the possibilities of 3D graphics software for use in the production of a computer game

1. Overview of basic graphics engines, and comparison of their capabilities depending on the uses
2. Analysis of the most popular computer games in terms of the graphics engine used and the software's efficiency
3. Comparison of graphics card performance depending on the graphics engine used
4. Introduction to virtual reality technology
5. Comparison of virtual reality glasses available on the market
6. The use of virtual reality for the needs of industry and home use

Including content related to practical professional preparation: [60%]

### Lessons

Initial classes refer to the previous two semesters in the field of computer graphics. Students prepare models and the environment to be implemented in the Unreal Engine graphics engine. Based on the graphics engine software, students test the engine's capabilities and performance in terms of real-time playback speed and the quality of the visual effects obtained. The next stage of work is to create a relations and interactions between objects, the use physics of solids and elastic objects. The final stage of the laboratory classes is to create a computer game or visualization using virtual reality technology.

Including content related to practical professional preparation: [100%]

### Project (other)

| | |
|---|---|
| Basic literature | 1. "Unreal Engine 4 for Design Visualization" Tom Shannon<br>2. "Beginning C++ Through Game Programming" Michael Dawson<br>3. "Getting Started with Unity 2018 - Third Edition" Dr. Edward Lavieri |
| Additional literature | |
| Teaching methods | Lecture with multimedia presentation, laboratory exercises, project presentations and discussion. |
| Form and terms of an exam | A final project in the form of a game or spatial visualization based on the Unreal Engine 4 graphics engine. Creation of the environment, generation of objects and interaction between them. The possibility of teamwork, depending on the design assumptions and the size of the project. Passing the project implemented in stages, supported by the discussion regarding the completed part of the project. The scope of knowledge given during the lecture is 50 percent. Project implementation for mobile devices. |