

## Subject card

|                                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                          |                                         |                                     |                                                                          |            |     |
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| Subject name and code                       | 3D Animation, PG_00210598                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                          |                                         |                                     |                                                                          |            |     |
| Field of study                              | Informatics                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                          |                                         |                                     |                                                                          |            |     |
| Date of commencement of studies             | October 2026                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                          | Academic year of realisation of subject |                                     | 2026/2027                                                                |            |     |
| Education level                             | Master's studies                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                          | Subject group                           |                                     | Obligatory subject group in the field of study<br>Optional subject group |            |     |
| Mode of study                               | full-time studies                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                          | Mode of delivery                        |                                     | at the university                                                        |            |     |
| Year of study                               | 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                          | Language of instruction                 |                                     | Polish                                                                   |            |     |
| Semester of study                           | 2                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                          | ECTS credits                            |                                     | 6.0                                                                      |            |     |
| Learning profile                            | academic                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                          | Assessment form                         |                                     | exam                                                                     |            |     |
| Conducting unit                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                          |                                         |                                     |                                                                          |            |     |
| Name and surname of lecturer (lecturers)    | Subject supervisor                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                          | dr Piotr Arłukowicz                     |                                     |                                                                          |            |     |
|                                             | Teachers                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                          |                                         |                                     |                                                                          |            |     |
| Lesson types                                | Lesson type                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Lecture                                                  | Tutorial                                | Laboratory                          | Project                                                                  | Seminar    | SUM |
|                                             | Number of study hours                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 30.0                                                     | 0.0                                     | 30.0                                | 0.0                                                                      | 0.0        | 60  |
|                                             | E-learning hours included: 0.0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                          |                                         |                                     |                                                                          |            |     |
| Learning activity and number of study hours | Learning activity                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Participation in didactic classes included in study plan |                                         | Participation in consultation hours |                                                                          | Self-study | SUM |
|                                             | Number of study hours                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 60                                                       |                                         | 0.0                                 |                                                                          | 0.0        | 60  |
| Subject objectives                          | The aim of the course is to teach students how to create computer animations in 3D. The basics of animation are covered, including Disneys 12 principles of animation, constraint systems, drivers, simulations, and shape animation methods combined with sound. Skeletal and procedural animations are discussed, as well as techniques for composing animations from simple individual actions. The course also includes a module on working with Motion Capture, where the application and use of character motion capture data are explored. Additionally, students learn how to render and edit films. |                                                          |                                         |                                     |                                                                          |            |     |

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| Learning outcomes               | Course outcome                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Subject outcome                                                                                                                                                                                                                                                                                                                                                                                                                 | Method of verification                                                      |
|                                 | [INFMU2_U08] is able to formulate and solve complex and unusual problems and perform tasks innovatively in unpredictable conditions by obtaining information from professional literature, databases, the Internet and other sources, integrate it, assess its credibility, make interpretations, draw conclusions and formulate opinions                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | The student is able to formulate and solve complex and non-standard problems in the field of 3D animation, particularly those related to motion modeling, rigging, character animation, procedural animation, and physical simulations, by independently acquiring, integrating, and critically evaluating information from technical documentation, professional literature, knowledge bases, the Internet, and other sources. | [SU4] test/exam - oral or written<br>[SU5] implementation of a problem task |
|                                 | [INFMU2_U08] is able to acquire information from professional literature, databases, the Internet and other sources, integrate them, assess their reliability, make interpretations and draw conclusions and formulate opinions                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Student potrafi samodzielnie pozyskiwać informacje z dokumentacji technicznej, literatury fachowej, tutoriali, baz wiedzy oraz innych źródeł dotyczących grafiki i animacji 3D, oceniać ich wiarygodność oraz wykorzystywać je do rozwiązywania problemów związanych z modelowaniem ruchu, riggingiem, symulacjami i tworzeniem animacji w środowisku Blender.                                                                  | [SU5] implementation of a problem task                                      |
|                                 | [INFMU2_K01] knows the limits of his own knowledge and understands the need for further learning                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | The student knows the limitations of their own knowledge and skills in the field of 3D graphics and animation, understands the need to independently improve their competencies, and follows the development of tools, techniques, and standards used in computer animation.                                                                                                                                                    | [SK4] test/exam - oral or written                                           |
|                                 | [INFMU2_K02] knows the limits of his own knowledge and understands the need for further learning                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | The student knows the limitations of their own knowledge and skills in the field of 3D graphics and animation, understands the need to independently improve their competencies, and follows the development of tools, techniques, and standards used in computer animation.                                                                                                                                                    | [SK4] test/exam - oral or written                                           |
| Subject contents                | <p>We start the classes as usual with the basics:<br/> Review (or introduction) to 3D graphics and using Blender<br/> Animations based on keyframe systems, control of time, speed, and motion dynamics<br/> Animation exercises using circular, figure-eight, and spiral motions; animation of a ball falling down stairs<br/> Constraints and limitations, controlling motion through movement, transferring parameters between objects, creating dependent animations exercise: crankshaft motion as in steam locomotive wheels<br/> Drivers advanced control of dependent motion and modeling and animating a planetary gear system. For those interested, there is also an optional animation of Cardan joint motion<br/> Introduction to bone-based animation systems<br/> Disneys 12 principles of animation<br/> Motion modeling using Squash &amp; Stretch ball animation, but this time with character<br/> Forward and inverse kinematics modeling hand movement with FK/IK systems, Custom Properties, and Drivers<br/> Optional: foot model and rig<br/> Full-body rig and Rigify, walk and run cycles<br/> NLA and composite animations made from actions animating a person walking a patrol path while performing simple additional actions (exercises, clapping, waving hands, etc.)<br/> Shape keys, lip-sync, and facial animation from now on models can talk, blink, and have facial expressions<br/> Introduction to Rigid Body simulations<br/> Optional: Soft Body simulations, deformations, elasticity, clothing, fabrics, flags, wind, etc.<br/> Optional: fluid simulations water, smoke, fire, explosions<br/> Optional: dynamic paint simulations dents, waves, trails, scratches, etc.</p> |                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                             |
| Prerequisites and co-requisites | Basic computer skills. Completion of a prior 3D Graphics course or a similar one, and/or familiarity with 3D animation software packages, is highly recommended.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                             |
| Assessment methods and criteria | Subject passing criteria                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Passing threshold                                                                                                                                                                                                                                                                                                                                                                                                               | Percentage of the final grade                                               |
|                                 | assignments                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 51.0%                                                                                                                                                                                                                                                                                                                                                                                                                           | 33.0%                                                                       |
|                                 | project                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 51.0%                                                                                                                                                                                                                                                                                                                                                                                                                           | 67.0%                                                                       |

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| Recommended reading                                            | Basic literature                                                                                                                                                                                                                                   | Tony Millen: Introducing Character Animation with Blender, John Wiley & Sons, ISBN13 9780470427378, ISBN10 047042737X                 |
|                                                                | Supplementary literature                                                                                                                                                                                                                           | Miguel Angel Manrique: Blender for Animation and Film-Based Production, Apple Academic Press Inc., EAN 9781482204742, ISBN 1482204746 |
|                                                                | eResources addresses                                                                                                                                                                                                                               |                                                                                                                                       |
| Example issues/<br>example questions/<br>tasks being completed | Animation of a rocket and a drone following it<br>Animation of a person eating at a table<br>Animation of a person falling into a hole<br>Animations of text, solids, geometric transformations, etc.<br>Animations of robots and machines at work |                                                                                                                                       |
| Work placement                                                 | Not applicable                                                                                                                                                                                                                                     |                                                                                                                                       |

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