Physics of computer games - course description

General information

Course name	Physics of computer games
Course ID	13.2-WF-FizD-PN-S19
Faculty	Faculty of Physics and Astronomy
Field of study	Physics
Education profile	academic
Level of studies	Second-cycle studies leading to MS degree
Beginning semester	winter term 2021/2022

Course information

Semester	2
ECTS credits to win	2
Available in specialities	Computer Physics
Course type	obligatory
Teaching language	english
Author of syllabus	• dr Marcin Kośmider

Classes forms

The class form	Hours per semester (full-time)	Hours per week (full-time)	Hours per semester (part-time)	Hours per week (part-time)	Form of assignment
Laboratory	30	2	-	-	Credit with grade

Aim of the course

The aim of the course is to familiarize students with the methods of computer physics used in computer games and animation.

Prerequisites

1. Knowledge of the dynamics of a material point and rigid body.

2. Knowledge of numerical methods

3. Knowledge of the basics of computer simulations

4. Programming in Python and / or C ++

5. Knowledge of the Linux operating system

Scope

1. Algorithms for solving equations of motion

2. Systems of non-interacting particles - "particle dynamics"

3. Masses connected by springs - "cloth simulations"

4. Dynamics of a rigid body - "ragdoll simulations"

5. Physics laws and simulations of real objects in games (simulators)

6. Methods of statistical physics in computer games - herd behavior, randomness

Teaching methods

Laboratory exercises, project method, group work, ideas exchange, brainstorming, presentation, work with documentation, independent acquisition of knowledge.

Learning outcomes and methods of theirs verification

Outcome description	Outcome symbols	Methods of verification	The class form
Student are able to discuss the theoretical basis (physical and mathematical) related to the dynamics of the material point and write the algorithms used in the form of computer program code.	• K2_W02 • K2_W05 • K2_U01 • K2_U03 • K2_U10 • K2_K02	• a preparation of a project • activity during the classes • an evaluation test • an ongoing monitoring during classes	• Laboratory

Outcome description	Outcome symbols	Methods of verification	The class form
Student is able to apply the laws of physics to the description and modeling of real objects modeled in games and computer animations.	• K2_W01 • K2_W02 • K2_W05 • K2_U01 • K2_U04 • K2_K03	• activity during the classes • an observation and evaluation of the student's practical skills • an ongoing monitoring during classes	• Laboratory
Student have theoretical knowledge in the field of modeling the layout of many interacting particles in a classical approach, can model such systems in the form of a computer program, knows and understands the limitations associated with the requirements of computer games	• K2_W01 • K2_W02 • K2_W05 • K2_W09 • K2_U01 • K2_U03 • K2_K02 • K2_K03	• activity during the classes • an observation and evaluation of activities during the classes • an ongoing monitoring during classes	• Laboratory
Student expand their skills in acquiring knowledge in a variety of ways using a variety of sources and has practical knowledge of modeling skills using a pseudorandom number generator and deterministic methods.	• K2_W01 • K2_W02 • K2_W05 • K2_U01 • K2_U04 • K2_K03	• activity during the classes • an observation and evaluation of activities during the classes • an ongoing monitoring during classes	• Laboratory

Assignment conditions

Semester project - 70% of the grade

Activity during classes - 30% of the grade

Recommended reading

1. Fizyka dla programistów gier, David M. Bourg , Helion 2003

2. Game Physics Engine Development, Millington Ian, Focal Press, 2010

3. Physics for Game Programmers, Grant Palmer, Apress 2005

Further reading

Internet

Notes

Modified by dr Marcin Kośmider (last modification: 09-05-2021 21:39)