SYLLABUS

Game Physics and Research Fundamentals 15 credits S0013E

Programmering av datorspelsfysik och grundläggande forskningsmetodik

Course syllabus admitted: Autumn 2023 Sp 1 - Present

DECISION DATE
2022-02-14

Luleå University of Technology 971 87 Luleå, Sweden
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LULEÅ TEKNISKA UNIVERSITET

Game Physics and Research Fundamentals 15 credits S0013E

Programmering av datorspelsfysik och grundläggande forskningsmetodik

First cycle, S0013E

Education level	Grade scale	Subject	Subject group (SCB)
First cycle	U G#	Medieteknik	Computer Technology

Entry requirements

In order to meet the general entry requirements for first cycle studies you must have successfully completed upper secondary education and documented skills in English language and as well as following requirements:
15 hp Mathematics, e.g:
M0038M Mathematics I - Calculus, 7.5 hp
M0043M Mathematics II - Calculus and linear algebra, 7.5 hp
M0052M Mathematics III - Differential equations and transforms, 7.5 hp

At least 30 hp in programming, with experience in programming for games, e.g:
D0037D Object oriented programming, 7.5 hp
D0041D Data structures and algorithms, 7.5 hp
S0011E Game Engine Architecture, 15 hp
S0012E Computer game systems, 15 hp

Selection

The selection is based on 1-165 credits.

Course Aim

The course aims to give an overview of physics-based realism in games and other real-time simulations. The course also aim to give the students a foundation for the reasons, and how, to research. After course completion, the student should be able to demonstrate:

- broad knowledge in the eld of computer game physics
- an understanding and ability to apply knowledge of mathematics and science for specific scenarios in game physics.
- an abilty to model, simulate, predict, and evaluate methods and algorithms for physics simulations in games.
- an ability to identify the need for further knowledge and to continuously upgrade their skills.
- an abilty to understand, implement, and develop algorithms for physics simulations in games.
- an ability to understand and implement physics simulations at the system level in a game engine.
- knowledge of computer games, the role of physics in computer games, as well as insight into the development process.
- fundamental knowledge in why we conduct research and how.

Contents

The course covers kinematics, rigidbody simulations, force and impulse based physics systems, collision detection, particle systems, discrete time-steps and iterative solvers for collision response. The course also covers research fundamentals.

Realization

Each course occasion´s language and form is stated and appear on the course page on Luleå University of Technology's website.
This course includes lectures and seminars and learning activities such as discussions, seminars and programming exercises where the student will be able to practice thinking in terms of physics programming, physics based systems and research.

Examination

If there is a decision on special educational support, in accordance with the Guideline Student's rights and obligations at Luleå University of Technology, an adapted or alternative form of examination can be provided.
Compulsory assignments and seminars. Oral presentations and written essays.
Each assignment is specified with requirements for each grade. The final grade is weighted average of the assignment grades.

Unauthorized aids during exams and assessments

If a student, by using unauthorized aids, tries to mislead during an exam or when a study performance is to be assessed, disciplinary measures may be taken. The term “unauthorized aids” refers to aids that the teacher has not previously specified as permissible aids and that may assist in solving the examination task. This means that all aids not specified as permissible are prohibited. The Swedish version has interpretative precedence in the event of a conflict.

Course offered by

Department of Computer Science, Electrical and Space Engineering

Modules

Code	Description	Grade scale	Cr	Status	From period	Title
0001	Laboratory work	U G#	2	Mandatory	A22	
0002	Laboratory work	U G#	5	Mandatory	A22	
0003	Laboratory work	U G#	5	Mandatory	A22	
0004	Oral presentation	U G#	1	Mandatory	A22	
0005	Report	U G#	2	Mandatory	A22	

Study guidance

Study guidance for the course is to be found in our learning platform Canvas before the course starts. Students applying for single subject courses get more information in the Welcome letter. You will find the learning platform via My LTU.

Syllabus established

by Jonny Johansson, HUL SRT 2022-02-14