

**SYLLABUS**

# **Computer graphics programming 15 credits S0009E**

**Programmering av datorspelsgrafik**

**Course syllabus admitted: Autumn 2024 Sp 1 - Present**

**DECISION DATE  
2024-02-15**

# Computer graphics programming 15 credits S0009E

## Programmering av datorspelsgrafik

### First cycle, S0009E

Education level	Grade scale	Subject	Subject group (SCB)
First cycle	G U 3 4 5	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 Deep knowledge in programming corresponding to D0009E Introduction to programming, D0037D Object oriented programming and D0041D Datastructures and algorithms; knowledge in mathematics corresponding to M0051M - Integrals, Vectors and Matrices.

Good knowledge in English equivalent to English 6.

## Selection

The selection is based on 1-165 credits.

## Course Aim

The course aims to give students a deep knowledge of theories in the field of computer graphics, as well as understanding the underlying principles and algorithms behind real-time rendering.

After course completion, the student should be able to demonstrate:

- broad knowledge in the field of computer graphics including understanding of relationships at the system level
- ability to apply knowledge of mathematics and science for to solve specific problems. This is demonstrated through presentation of concepts for real-time rendering in computer games.
- ability to model, simulate, predict and evaluate methods and algorithms for real-time rendering in computer games. This is demonstrated through laboratory simulations.
- ability to implement and develop algorithms for computer graphics and real-time rendering in computer games.
- ability to apply understanding and insights of computer graphics into the development process of computer games.
- ability to implement and develop optimised algorithms for computer graphics.
- ability to apply understanding of the rendering equation to implement realistic shading algorithms.

## Contents

The following topics will be covered in this course:

- Modern rendering pipelines
- Basic tools for manipulation of objects and views
- Scene graphs
- Data structures for real-time rendering
- Definition of material and light properties for real-time rendering
- Texture mapping algorithms
- Real-time lighting and shading
- Optimization algorithms for real-time rendering
- Realtime and "offline" raytracing
- Geometrical algorithms for surface rendering
- Animation systems
- Global illumination
- Terrain Rendering

## Realization

Each course occasion's language and form is stated and appear on the course page on Luleå University of Technology's website.

The teaching consists of lectures, laborations and seminars.

Student will practice critical thinking and discuss aspects of time critical programming, data oriented patterns and real-time rendering.

## 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 grade.

## 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
0003	Laboratory work 1	G U 3 4 5	1	Mandatory	A24	
0004	Laboratory work 2	G U 3 4 5	2	Mandatory	A24	
0005	Laboratory work 3	G U 3 4 5	2	Mandatory	A24	
0006	Laboratory work 4	G U 3 4 5	2	Mandatory	A24	
0007	Laboratory work 4	G U 3 4 5	2	Mandatory	A24	
0008	Laboratory work 6	G U 3 4 5	2	Mandatory	A24	
0009	Laboratory work 7	G U 3 4 5	2	Mandatory	A24	
0010	Oral and written presentation	U G#	2	Mandatory	A24	

## 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.

## Last revised

by Robert Brännström 2024-02-15

## Syllabus established

by Jonny Johansson, HUL SRT 2021-02-16