Computer Graphics

Programme course

6 credits

Datorgrafik

TSBK07

Valid from: 2017 Spring semester

Determined by
Board of Studies for Computer Science
and Media Technology

Date determined
2017-01-25

Main field of study

Information Technology, Computer Science and Engineering, Electrical Engineering

Course level

Second cycle

Advancement level

A1X

Course offered for

- Computer Science and Engineering, M Sc in Engineering
- Industrial Engineering and Management - International, M Sc in Engineering
- Industrial Engineering and Management, M Sc in Engineering
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- Applied Physics and Electrical Engineering, M Sc in Engineering
- Mathematics, Master's programme
- Information Technology, M Sc in Engineering
- Applied Physics and Electrical Engineering - International, M Sc in Engineering
- Computer Science and Software Engineering, M Sc in Engineering

Entry requirements

Note: Admission requirements for non-programme students usually also include admission requirements for the programme and threshold requirements for progression within the programme, or corresponding.

Prerequisites

Linear algebra. Programming knowledge.

Intended learning outcomes

The course describes the principles and methods for computer generation of synthetic images, animations and interactive graphics applications. After the course you should be able to describe some of the computational models used in computer graphics of how a synthetic image is built up and, more specifically described under "course content". You should be able to use OpenGL to build the synthetic three-dimensional scenes and generate images from them. You should also be able to use this knowledge to design and implement interactive 3D graphics such as simple virtual worlds, 3D games etc.

The course has focus on real-time performance and on using modern methods of the subject. Hence, shader programming (programming of graphics processors) is an essential component of the course.

Course content

Real-time animation with OpenGL 3.2 including shader programming with GLSL. Three-dimensional graphics: geometric transformations, projection, perspective. Object representation. Fractals. Light models and shading, Gouraud and Phong shading. Texture mapping. Text. Visible surface detection. Large worlds, frustum culling, level of detail, billboards. Animation, collision detection. Low-level graphics: Lines, polygon rendering, anti-aliasing. Ray-tracing, radiosity.

Teaching and working methods

Lectures, lab exercises and a project. The course runs over the entire spring semester.

Examination

PRA1	Project, oral and written examination	2 credits	U, G
LAB1	Laboratory work	2 credits	U, G
TEN1	Written examination	2 credits	U, 3, 4, 5

The laboratory course comprises assignments that should be solved and presented in the lab.

Grades

Four-grade scale, LiU, U, 3, 4, 5

Other information

Supplementary courses:
Advanced game programming, Images and graphics project course

Department
Institutionen för systemteknik

Director of Studies or equivalent
Klas Nordberg

Examiner
Ingemar Ragnemalm

Education components
Preliminary scheduled hours: 48 h
Recommended self-study hours: 112 h

Course literature
I. Ragnemalm: "Polygons feel no pain"

Common rules

Regulations (apply to LiU in its entirety)

The university is a government agency whose operations are regulated by legislation and ordinances, which include the Higher Education Act and the Higher Education Ordinance. In addition to legislation and ordinances, operations are subject to several policy documents. The Linköping University rule book collects currently valid decisions of a regulatory nature taken by the university board, the vice-chancellor and faculty/department boards.

LiU's rule book for education at first-cycle and second-cycle levels is available at http://styrdokument.liu.se/Regelsamling/Innehall/Utbildning_pa_grund-_och_avancerad_niva.