UNIVERSITY OF GOTHENBURG

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

DIT227 Advanced Computer Graphics, 7.5 credits

Avancerad datorgrafik, 7,5 högskolepoäng

Second Cycle

Confirmation

This course syllabus was confirmed by Department of Computer Science and Engineering on 2019-04-15 to be valid from 2020-01-20, spring semester of 2020.

Field of education: Science 100%
Department: Department of Computer Science and Engineering

Position in the educational system

The course is offered within several programmes. It is also a single subject course at the University of Gothenburg.

The course can be part of the following programmes: 1) Computer Science, Master's Programme (N2COS), 2) Applied Data Science Master's Programme (N2ADS), 3) Computer Science, Bachelor's Programme (N1COS) and 4) Game Design & Technology Master's Programme (N2GDT)

Main field of studies	*Specialization*
Interaction Design	A1F, Second cycle, has second-cycle course/s as entry requirements
Computer Science	A1F, Second cycle, has second-cycle course/s as entry requirements

Entry requirements

To be eligible for the course, students should have successfully completed courses corresponding to 120 hec within the subject of Computer Science, Mathematics, Software Engineering, or equivalent, including 7.5 hec course in Computer Graphics (DIT224 or equivalent).

Applicants must prove knowledge of English: English 6/English B or the equivalent level of an internationally recognized test, for example TOEFL, IELTS.

Learning outcomes

On successful completion of the course the student will be able to:

Knowledge and understanding

- describe and apply advanced algorithms, often at a research level, and processes used to create computer graphics in 3D-games and/or movies

Competence and skills

- implement advanced algorithms used to generate real-time renderings and photo realistic renderings, or GPU algorithms, as part of a project
- present and describe one or a few advanced algorithms used in computer graphics

Judgement and approach

- judge and select suitable algorithms and methods for specific advanced sub problems in computer graphics and/or GPU programming

Course content

The course aims to deepen and broaden the knowledge about three dimensional computer graphics. It is a follow-up course to an introductory course in computer graphics, that gives the students a chance to dig deeper into particular subjects and also to perform a project.

There will be compulsory seminars, where more details on a research-level will be presented for a selection of topics, e.g.:

- ambient occlusion,
- hair rendering,
- GPGPU applications,
- ray tracing and global illumination,
- advanced path tracing,
- GPU-ray tracing,
- hard and soft shadows,
- real-time indirect illumination,
- spherical harmonics, etc.

Sub-courses

1. **Project** *(Projekt),* 6 credits
   Grading scale: Pass with Distinction (VG), Pass (G) and Fail (U)
2. **Seminars** *(Seminarier),* 1.5 credits
   Grading scale: Pass (G) and Fail (U)

Form of teaching
Project work, individually or in groups of 2-3 students. Compulsory seminars.

Language of instruction: English

Assessment
The course is examined with a programming project which is presented orally and with an oral presentation of a research paper. The project, and the oral presentation, is performed in a group of two students or individually.

To pass the course, the student must also:

- Attend 80% of the seminars
- Submit written discussion points for three of the seminars

The course includes a number of optional homework assignments that can give bonus points that count toward the final grade.

If a student, who has failed the same examined component twice, wishes to change examiner before the next examination, a written application shall be sent to the department responsible for the course and shall be granted unless there are special reasons to the contrary (Chapter 6, Section 22 of Higher Education Ordinance).

In cases where a course has been discontinued or has undergone major changes, the student shall normally be guaranteed at least three examination occasions (including the ordinary examination) during a period of at least one year from the last time the course was given.

Grades
The grading scale comprises: Pass with Distinction (VG), Pass (G) and Fail (U).
A Pass grade (G) for the entire course requires at least a Pass grade for all sub-courses and that the student has fulfilled all the other mandatory parts. To be awarded Pass with Distinction (VG) for a full course, the student must, in addition, receive the grade VG on the sub-course Project.

Course evaluation

The course is evaluated through meeting after the course between teachers and student representatives. Further, an anonymous questionnaire is used to ensure written information. The outcome of the evaluations serves to improve the course by indicating which parts could be added, improved, changed or removed.

Additional information

The course is a joint course together with Chalmers.

Course literature to be announced the latest 8 weeks prior to the start of the course.

The course replaces the course DIT226 Computer Graphics, Advanced course, 7.5 credits. The course cannot be included in a degree which contains DIT226. Neither can the course be included in a degree which is based on another degree in which the course DIT226 is included.