Advanced Global Illumination and Rendering

Programme course

6 credits

Advanced Global Illumination and Rendering

TNCG15

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

Computer Science and Engineering, Media Technology and Engineering

Course level

Second cycle

Advancement level

A1X

Course offered for

- Media Technology and Engineering, M Sc in Engineering
- Computer Science and Engineering, M Sc in Engineering
- Information Technology, M Sc in Engineering
- Computer Science and Software Engineering, M Sc in Engineering
- Computer Science, Master's programme

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

Computer graphics, 3D Computer Graphics and Animation

Intended learning outcomes

This course will explore topics in computer graphics image synthesis in considerable depth. The focus of the course will be on global illumination, the simulation of indirect illumination in 3-dimensional scenes consisting of dull (diffuse) surfaces, and shiny (specular) surfaces, and foggy transparent volumes.

Course content

The course will include the following topic areas: optics and light, ray tracing and radiosity algorithms, Monte Carlo sampling and integration,general strategy for solving the rendering equation, stochastic path tracing, introduction to finite element methods, matrix and progressive radiosity, mesh generation for radiosity, complex scenes, clustering, photon mapping and caustics, perception and display, trends and future research. The learning outcomes for the course are:

- Ability to analyse and criticise a scientific paper
- Present a scientific work
- Implement an algorithm in Global Illumination
- Differentiate between various forms of Global Illumination algorithms

Teaching and working methods

Background lectures, followed by student research paper presentations, followed by project work.

Examination

UPG1 Project work with oral and written presentation U, 3, 4, 5 6 credits

Evaluation of the course will be in the form of an assessment of an oral presentation by the students in the middle of the period. A software project will also form a part of the course and this project, together with the project report, will be graded.

Grades

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

Department

Institutionen för teknik och naturvetenskap

Director of Studies or equivalent

Camilla Forsell

Examiner

Mark E Dieckmann

Education components

Preliminary scheduled hours: 34 h
Recommended self-study hours: 126 h

Course literature

Additional literature

Books

Dutre, *Advanced Global Illumination*Jensen, *Photon Mapping*Pharr and Humphreys, *Physically Based Rendering: From Theory to Implementation*

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.