



Course Module Description

General module information

Title: Real-Time Computer Graphics

Type: Course module

Language of instruction: English

Location of lecture: Campus Aalborg, Campus Copenhagen

ECTS points: 5 ECTS

Period: 1 September 2022 — 31 January 2023

Placement

1st semester, M.Sc. in Medialogy

Module coordinator

[Claus B. Madsen](#) (teacher), [Henrique Galvan Debarba](#) (teacher), [Nicola Walker](#) (secretary AAL), [Judi Stærk Poulsen](#) (secretary CPH)

Academic content and relationships to other modules/semesters

The formal study plan description of the module can be found here:

<https://moduler.aau.dk/course/2022-2023/MSNMEDM1223?lang=da-DK>

The objective of the module is to provide students with a strong foundation, and state-of-the-art competences, in the area of Computer Graphics, with applications in graphics for games and interactive media. Game engines such as Unity and Unreal provide powerful real-time rendering and animation functionality, much of which standard developers might not be qualified to fully utilize. This module aims at providing students with the theoretical background and in-depth understanding of high-end rendering techniques, so as to enable them to utilize game engine rendering to its full potential, to choose the optimal approach to rendering challenges, and to design novel solutions to such challenges. The module will also introduce applications for media content creation and visual storytelling, such as real-time filmmaking, animation and virtual production techniques.

Objectives and learning goals

Students who complete the module will obtain:

- knowledge of light-matter interaction in the form of radiometric and photometric concepts
- understanding of fundamental rendering challenges, and core aspects of the tradeoff between rendering quality and computational requirements
- understanding of state-of-the-art rendering techniques that position themselves on various levels of this tradeoff

Students who complete the module will be able to:

- apply pre-rendered or real-time rendered advanced rendering techniques, such as baking, light probes, High Dynamic Range formats, tone mapping, raytracing, etc.
- analyze the applicability of state-of-the-art rendering techniques in relation to relevant rendering challenges and requirements
- apply rendering for media content creation, such as animation production, real-time filmmaking, virtual production, interactive experiences, games or other relevant application areas
- evaluate affordances and limitations of advanced rendering techniques, and synthesize/create novel rendering solutions for interactive real-time Computer Graphics, e.g. for media content creation such as games, XR experiences, virtual production, animation and real-time filmmaking

Extent and expected work load

Lectures and preparation for lectures: approx. 2 ECTS

Mini-project/assignments: approx. 2 ECTS

Preparation for exam: approx. 1 ECTS

**Pre-requisites for participation**

See the module description (find the link above) for any further detail on pre-requisites.

Examination

Modality and duration: Individual oral exam based on submitted project. The duration will be 15 minutes, followed by 5 minutes deliberation

The project will be developed in small groups. Students will hand in a short report, together with the implementation code. The report should also describe the participation (tasks and responsibilities) of each group member, which will be considered during individual examination.

Assessment: In accordance with the 7-point grading scale

Pre-approved aids: Project documentation

Prerequisites for participation: Timely hand-in of required assignments and project documentation

Further detail on the exam:

The project will be developed in small groups. Students will hand in a short report, together with the implementation code. The report should also describe the participation (tasks and responsibilities) of each group member, which will be considered during individual examination.

In the beginning of the exam the student will do an approximately 5 minutes presentation of the developed project, after which the examiner will ask follow-up questions within the topic of the project and curriculum topics related to it. The grade will be based on a joint evaluation of the quality of the project and the oral examination.