Linnæus University
Sweden

Study guide

2DT904 – Computer Graphics

Autumn 2024, 5hp – 33%

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Introduction

Welcome to this introductory course in modern computer graphics.

You can find the course syllabus here: https://kursplan.lnu.se/kursplaner/syllabus-2DT904-0.pdf

The moodle page for the course will open approximately two weeks before the course begins.

Examinations

The course is assessed with grades A through F. The grade A constitutes the highest grade on the scale, and the remaining grades follow in descending order, where the grade E is the lowest grade that will result in a pass.

The examination of the course is divided into two distinct parts: theoretical assignments and a programming assignment, which both contribute equally to the final grade for the course. All assignments use the same scale as the course, and you need a passing grade on every assignment to get a passing grade on the course.

This table, mapping percentages of points to grades, is used for all assignments.

Points	> 60%	> 70%	> 80%	> 90%	> 95%
Grade	E	D	C	B	A

Theoretical assignments

There will be two theoretical assignments in the course. One covers approximately the first half of the course, and the other the second half of the course. You need a passing grade on both individual assignments, and the mean result of the two assignments will be your result for this part of the course.

Programming assignment

There will be one programming assignment in the course. It will open around halfway through the course, and the deadline will be at the end of the course.

In the programming assignment, there will be some bonus points awarded for clean code and good programming practice. What that means in practice is that it is actually possible to get a 110% score. Those bonus points can be enough to reach that next grade, but they will only be considered if you already have a passing grade, i.e., > 60% of the “standard” points of the assignment. The details of how to be awarded the bonus points will be laid out in the assignment.

Reexams

If you have failed (or failed to hand in) any of the assignments, there will be an opportunity for re-examination approximately one month after the course has ended.

Literature

We've added some books to the list of literature compared to the course syllabus. All books are available in full text, for free, via the university library (https://ub.lnu.se/?lang=en).

- Hearn, D. Donald, Baker, M. Pauline and Carithers, Warren, *Computer Graphics with OpenGL*, Fourth edition, Pearson, 2014. Approx. 70 pages out of 812.
- Stemkoski, Lee and Pascale, Michael. *Developing Graphics Frameworks with Python and OpenGL*, First edition. CRC Press, 2022. Approx. 230 pages out of 331.
- Möller, Tomas et al. *Real-Time Rendering*. Fourth edition. Boca Raton: CRC Press, 2018.

Developing Graphics Frameworks with Python and OpenGL will be the primary book of the course. It's a very practical book but a bit lacking in the academic sense. So, when we need some more depth, I'll use the other books.

Computer Graphics with OpenGL is the original literature for this course, but it uses a very old version of OpenGL that is practically obsolete by now. It still contains valuable information concerning various algorithms and "classical" computer graphics concepts.

Real-time Rendering is a magnificent reference for all things related to modern real-time computer graphics. We will probably not use it very much, but I want you to know that it exists. I will only use it for optional, more in-depth, reading or to give another perspective / explanation of a concept.

Course outline

All pages in the reading requirements are in the *Developing Graphics Frameworks with Python and OpenGL* book. It will be complimented with sections in the other books, where applicable, before the course begins. You will always be able to find the latest information on the course's moodle page.

Week	Theme	Reading (preliminary)	Labs	Homework
46	Introduction	Ch. 1 Ch. 2 (p. 25 – 45)	Dev. Environment and minimal OpenGL app.	Assignment 1 opens.
47	Object representation	Ch. 2 (p. 46 – 77) Ch. 4 (p. 144 – 163) Ch. 3 (ex p. 83 – 112)	Vertex buffers, attributes, and vertex shaders.	
48	Scenes	Ch. 3 (119 – 132) Ch. 4 (p. 133 – 142)	Scene graphs	
49	Viewing	Ch. 3 (p. 112 – 119) Ch. 4 (p. 142 – 143)	Camera transformations	
50	Rasterization	TBD	Fragment shaders	Assignment 2 opens. Programming assignment opens. Deadline assignment 1 (13/12).
51	Illumination	Ch. 6 (p. 267 – 291)	Different kinds of lights	
52	X-MAS			
1				
2	Texturing	Ch. 5 (p. 193 – 228)	Texturing	
3	Own work with the assignments			Deadline assignment 2 and programming assignment. (17/1)