DM567 3D Graphics Programming
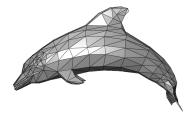
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- Visualizations (architecture, data,. . .)

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- Visualizations (architecture, data,. . .)
- Virtual reality, augmented reality

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Note: The exam is based primarily on 1.

For programming, we will use Java + OpenGL (via JOGL).

Course Contents

1. Overview of the 3D graphics pipeline (from 3D geometry to pixels).
2. Manipulation of 3D geometry
   - Homogeneous coordinates
   - Transformation matrices
   - Projection matrices
   - Quaternions
3. Rendering (coloring pixels)
   - Shading
   - Textures
4. Various techniques (skyboxes, billboards, environment mapping, shadows,...)
5. The non-programmable part of the pipeline: barycentric coordinates, interpolation, clipping, rasterization

Subjects NOT covered

1. AI for games (path finding, chasing and evading, fighting, flocking, decision making, game trees,. . .)
2. Physics simulation
3. Collision detection
4. Game engines
5. Game testing
6. Game level editors, scripting
7. 3D modeling
8. Artwork
9. Animation
10. Sound, music
11. Gameplay, narrative, study of genres

Items 1–3 are good subjects within computer science, but course is too short. Items 4–6 are too thin (not teaching much principles). Items 7–11 are outside computer science.

Formal Course Description

Prerequisites:	Knowledge and maturity corresponding to two years of a bachelor in Computer Science. Programming proficiency in Java.
Literature:	Textbook, notes, slides.
Evaluation:	Written multiple-choice exam (7-scale)
Credits:	5 ECTS
Course language:	English

We assume zero knowledge of 3D graphics/programming at start.

Notes and slides are a core part of the exam curriculum.

Disclaimer

- Includes quite some reading (book pages and API documentation).
- Includes actual math.

Textbook

Computer Graphics Programming in OpenGL with Java, by V. Scott Gordon and John Clevenger, Mercury Learning & Information. 2017.

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- ▶ Some of the theory.
- ▶ Very good intro to OpenGL (via JOGL) in Java.
- ▶ Lots of code examples and some exercises.
- ▶ Instructions for installing (for Mac, see website of Scott Gordon).
- ▶ Available as ebook at the publisher www.merclearning.com or at Amazon. Price: USD 39/EUR 35/DKK 250. Buying gives you access to all example programs (via mail to publisher, see inside of cover).

Course Workform

Two weeks (10 work days).

Typical day:

- ▶ Recap and questions on yesterday's material
- ▶ Multiple-choice quiz on yesterday's material
- ▶ Lecture
- ▶ Labs, exercises, reading,

All info via course web page. MC quiz and final exam via course BB entry.