DM842
Computer Game Programming

Rolf Fagerberg, Marco Chiarandini

10 ECTS, Fall 2014

Why Computer Game Programming?

- Fun, attraction, curiosity
- Career goal
- Great display of use of many Computer Science subjects and courses:
  - Programming
  - Algorithms and data structures
  - Linear algebra and other math
  - Numerical analysis
  - AI (eg. finite automatons from DM517)
  - Computer architecture

Computer Game Development

- Large game company (100+ persons):
  - Game programmers: 30–40
  - Game artists, model designers: 30–40
  - Game level designers, testers: 10–30
  - Game designers: 2
  - Game producers: 4
  - Business and management persons: 5–10

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- Casual game company (1–3 persons):
  - Each person has many roles.

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Computer games in Computer Science: the study of

> Methods and principles of game programming

Computer Game Courses at Imada

Previously:

- DM809 Computer Game Programming I: Graphics (5 ECTS)
- DM810 Computer Game Programming II: AI (5 ECTS)
- DM815 Computer Game Programming III: Physics (5 ECTS)

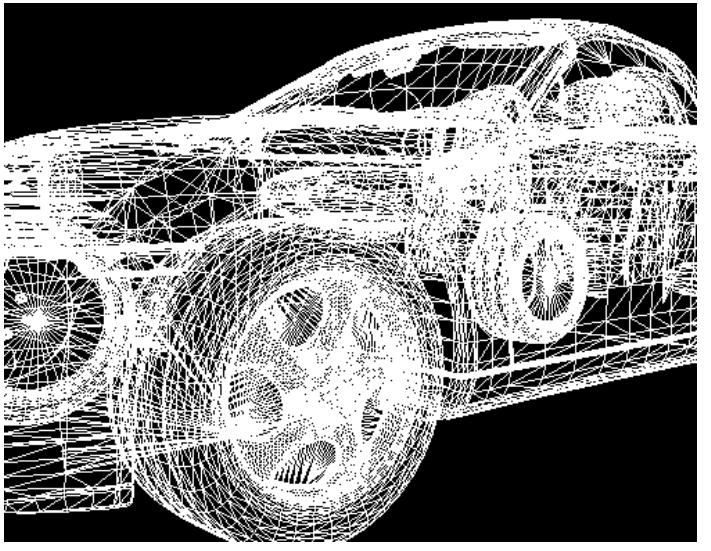
Now:

- DM842 Computer Game Programming (10 ECTS)

Same contents (sligthly compressed).

Subjects covered in DM842

- The graphics pipeline:
  - 3D geometry (transformation, projection)
  - Shading (color, textures, lights, shading models)
  - Image based techniques (skyboxes, billboards,. . .)
  - Polygonal techniques (culling, level of detail)
- Game AI (path finding, chasing and evading, fighting, flocking, decision making, game trees,. . .)
- Collision detection
- Rigid body physics simulation



Subjects *not* covered

- Graphics APIs (self-study, is included in textbook)
- Software engineering, testing
- Game engines
- Level editors, scripting
- Modeling
- Artwork
- Animation
- Sound, music
- Gameplay, narrative, study of genres

Formal Course Description

Prerequisites:	Algorithms and data structures (DM507), programming proficiency, knowledge of vectors and matrices
Literature:	Textbooks
Evaluation:	Implementation projects (pass/fail), oral exam (7-scale)
Credits:	10 ECTS
Course language:	Danish and/or English

Project

Small project (in groups of 2–3) must be passed to attend the oral exam:

> Implement a 3D visualization of a (very) simple game, including some AI and physics simulation.

Programming language and graphics API of own choice. Must run on either Imada machines (Linux), or a recent Windows.

Some suggestions for API and language:

- C++ and OpenGL
- Java and OpenGL-binding (e.g. JOGL)
- C++/C# and DirectX

Disclaimer

- Includes reading quite a number of pages
- Includes buying several textbooks
- Includes actual math
- Includes programming
- Includes work on issues not taught explicitly in course (graphics APIs)

Rather heavy - but fun - workload.

Textbook

Computer Graphics Through OpenGL, 2nd edition.
Sumanta Guha, Chapman and Hall/CRC. 2014.

- University level.
- Right coverage of subjects.
- Integrates theory and OpenGL.
- Lots of figures, code, examples, exercises.
- Instructions for installing OpenGL on Ubuntu, Mac, and Win on its website.
- Uses the “legacy” features of OpenGL, for pedagogical reasons. Coverage of the OpenGL 4.3 (shaders) in the last chapters. So run OpenGL in “compatibility mode” (see book and website for instructions) for most parts of this course.

Other Ressources

- The OpenGL site
- The OpenGL “Red Book” (OpenGL programming guide).
- *Lots* on the web.
- Lots of other books.

But: Beware of the legacy/deprecated vs. new (everything-by-shaders) OpenGL main styles.