DM809
Computer Game Programming I: Graphics

Rolf Fagerberg

1st quarter, Fall 2012

Why Computer Game Programming?

- Fun, attraction, curiosity
- Career goal (in US, game industry twice as large as movie industry in sales)
- Great display of use of many Computer Science subjects and courses:
  - Programming (DM502, DM503, DM529)
  - Algorithms and data structures (DM507)
  - Linear algebra and other math (DM527, MM501, MM502, MM505)
  - Numerical analysis (MM518)
  - AI (eg. finite automatons from DM517)
  - Computer architecture (DM506)

Computer Game Development

- Large game company (100 persons, 20 M$/year turnover):
  - 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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Computer games in Computer Science: the study of

> Methods and principles of game programming

Computer Game Courses at Imada

Fall 2012, 1st quarter:

DM809 Computer Game Programming I: Graphics

Fall 2012, 2nd quarter (Marco):

DM810 Computer Game Programming II: AI

Spring 2013, 3rd quarter:

DM815 Computer Game Programming III: Physics

Possible individual study activity:

DM816 Computer Game Programming IV: Project

Subjects covered (all three courses)

- The graphics pipeline
- 3D geometry (transformation, projection)
- Shading (color, textures, lights, shading models)
- Polygonal techniques (culling, level of detail)
- Image based techniques (skyboxes, billboards,. . .)
- Game AI (path finding, chasing and evading, fighting, flocking,. . .)
- Collision detection
- Physics modeling

Subjects not covered

- OpenGL (covered thoroughly by textbook, but only briefly at lectures)
- Software engineering, testing
- Game engines
- Level editors, scripting
- Modeling
- Artwork
- Animation
- Sound, music
- Gameplay, narrative, study of genres

Formal Course Description

Prerequisites:	Programming (DM502+DM503), algorithms and data structures (DM507), vectors and matrices (DM527, MM505), and matematical maturity (MM501+MM502)
Literature:	Textbook
Evaluation:	Implementation projects (pass/fail), oral exam (7-scale)
Credits:	5 ECTS
Course language:	Danish 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

Must run on either Imada machines (Linux), or on Windows XP or Vista.

Some suggestions:

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

Disclaimer

- Includes reading quite a number of pages
- Includes actual math
- Includes programming
- Includes work on issues not taught extensively in course (OpenGL API)

Rather heavy workload. But, hopefully, fun.

Textbook

Computer Graphics Through OpenGL Sumanta Guha, Chapman and Hall/CRC. 2010.

- 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.

Other Ressources

- The OpenGL site
- The OpenGL “Red Book”.
- *Lots* on the web. Look in particular at the tutorials at NeHe Productions.
- Lots of other books.