



Information Coding / Computer Graphics, ISY, LITH

TSBK07 Computer Graphics Spring 2007

**Examiner/lecturer:
Ingemar Ragnemalm
ingis@isy.liu.se / ingemar@ragnemalm.se**

**Course home page:
<http://www.computer-graphics/TSBK07.html>**



Information Coding / Computer Graphics, ISY, LITH

This lecture

Course plan and overview

The course subject

Projects, some demos

Graphics systems

Graphics APIs



Information Coding / Computer Graphics, ISY, LiTH

Who am I?

- Lecturer/associate professor
- Researcher (image analysis)
- Game & graphics programmer
 - Hacker



Information Coding / Computer Graphics, ISY, LiTH

Who are you?

- 120, 160, 180 point programs
 - International students

MOST of you have no prior experience of CG
SOME of you have some experience of CG
A FEW of you have extensive experience of CG

All of you know some programming. (Some are
“wizards”)



Information Coding / Computer Graphics, ISY, LiTH

**Examiner/lecturer:
Ingemar Ragnemalm**

**Lab assistants:
Fredrik Vikstén
Mikael Kalms
(-- more --)**



Information Coding / Computer Graphics, ISY, LiTH

Time schedule

VT1:

**Lectures (14)
Labs (3)
Project specifications**

VT2:

**Project work
Project demonstrations
Reports
Lessons (2)
Written exam**



POTENTIAL PROBLEM:

It seems many students have planned only VT2! (Bad information at Studentportalen?)

How many?

How many can include VT1 anyway?

**Some kind of remedy is being worked on.
Extra lectures? Extra labs?**

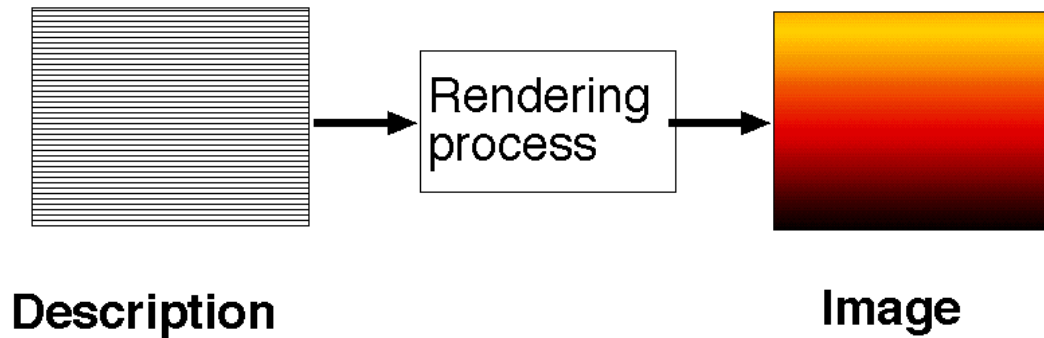


Image-related technologies:

**Image Processing
Image Editing
Computer Graphics
Image Analysis
Computer Vision
Image Coding
Image Compression
Graphic Arts
Tomography
etc...**



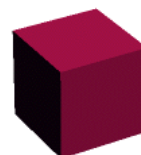
Computer Graphics



Computer Graphics:

Creating images from non-image data

```
Cube =  
(10, 10, 10)  
(10, 10, 20)  
(10, 20, 10)  
(10, 20, 20)  
(20, 10, 10)  
(20, 10, 20)  
(20, 20, 10)  
(20, 20, 20)  
Camera =  
(60, 60, 60) (15,15,15)
```





Information Coding / Computer Graphics, ISY, LiTH

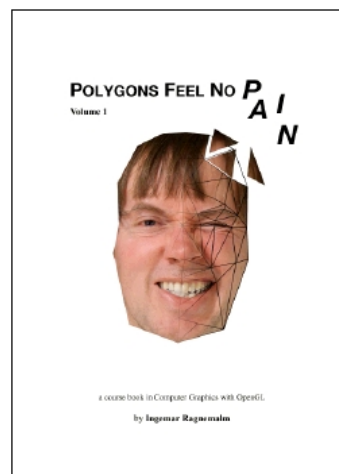
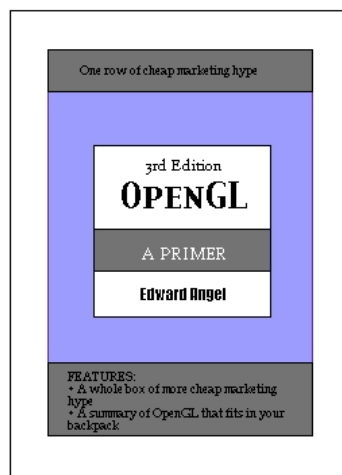
Lecture plan (preliminary)

1. Introduction, graphics systems, API's
2. 2D graphics, OpenGL introduction
3. 3D transforms, 3D engines
4. Rotation around arbitrary axis, light models
5. Shading, intro to hidden surface elimination
6. Texture mapping, other mappings
7. Shader programs, GLSL
8. Low-level algorithms
9. Pixel geometry, anti-aliasing, polygon rendering
10. Hidden surface elimination, large worlds
11. Animation, collision detection
12. Ray-tracing and radiosity
13. Curves and surfaces
14. More curves and surfaces, fractals



Information Coding / Computer Graphics, ISY, LiTH

Course books





Information Coding / Computer Graphics, ISY, LiTH

Course home page and forum

www.computer-graphics.se

Course information, lab material, updates...

A phpBB forum is open. Open discussions - you can get help from course mates as well as from me!

Will be as useful as *you* make it!
Sign up and take advantage of it.



Information Coding / Computer Graphics, ISY, LiTH

Learning goals

You should get:

- Experience of computer graphics programming (OpenGL)
- Learn important concepts and methods for implementing computer graphics applications
- Understanding of some important low-level graphics algorithms

Everybody should learn something new!



Information Coding / Computer Graphics, ISY, LiTH

Laborations

Lab 1: Intro to OpenGL
Lab 2: More OpenGL, virtual world
Lab 3: Shader programming with GLSL

Projects

Small projects! \approx 1.5 week of full time work.

\approx 1 day to define the project
 \approx 1 day for research
 \approx 3 days for implementation
 \approx 1 day for documentation
 \approx 2-3 days for unfinished business

Lessons

2 lessons at the end, preparing for the exam



Information Coding / Computer Graphics, ISY, LiTH

Projects:

Define a course-related problem to go deeper into.

2-4 people in each group.

Consider the project now and then during lectures and labs

Project suggestions should be handed in at the end of VT1!

Implement in VT2

Allocate time!



Resources:

It is allowed to use any material that you come across, i.e. on the web.

It is not allowed to do that without documenting it!

You must tell what you use and what you have added yourself!



Project examination:

- **Short presentation (3-4 groups at a time)**
- **Demonstration in the lab or on some other suitable computer**
 - **Written report**

This should take place in may, with time left after it for the final work for the written exam.



Project ideas:

- 3D labyrinth
- Interactive solar system
- Robot with moveable limbs
 - Driving simulator
 - Flight simulator
- Large virtual reality
 - Face animation



Advanced project ideas:

- Advanced collision detection/handling
- Low level renderer with clipping and texture mapping
 - Procedural trees
 - Terrains, geomipmapping
- Pixelwise shading or surface detail with shader programs
 - Light mapping
 - Shadows

But don't aim too high!



Different people have different style...

All project should not be similar!

- Some focus on specific algorithms
- Some are “applications”, like games
 - Some are artistic, “demos”

Do it *your way!*



Grades

Your grade is determined by the written exam!

...but...

Particularly good projects may qualify for bonus points on the exam!

- Projects that are significantly more complex than a normal project
- Projects that are polished enough to be “finished products”
- Projects that are based on current research

The bonus can not help you pass the exam, but may give you a higher grade! Must be applied for, not automatic.

Level of bonus: 5 points (1/2 grade step)



Information Coding / Computer Graphics, ISY, LITH

**The lab material will appear soon on the
course home page:**

<http://www.computer-graphics/TSBK07.html>

Lab skeletons in C (lab 1-2) and GLSL (lab 3)

Lab location:

Asgård, Egypten, Olympen:
Entrance 25, upper floor

Southfork:
Entrance 27, upper floor, corridor C