

CSC 4356 / ME 4573 Interactive Computer Graphics

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Louisiana State University
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Interactive Computer Graphics

An introduction to 3D computer graphics, emphasizing real-time graphics programming using OpenGL and the C or C++ programming language. Topics include the fixed function and programmable 3D pipelines, transformation, interaction, texturing, lighting, performance analysis, optimization, and a variety of intermediate and advanced topics.

Prerequisites

- C / C++ (csc 1253-1254 *or eq.*)
- Data structures (csc 3102 *or eq.*)
- *No prior experience with 3D graphics or OpenGL*

Website

<http://csc.lsu.edu/~kooima/csc4356/index.html>

- Administrivia
- Course schedule
- Assignment details
- Grade sheets

OpenGL

OpenGL is the industry-standard cross-platform real-time 3D API. First released in 1992, OpenGL is a constantly-evolving interface that adapts to the changing capability of modern 3D graphics hardware.

OpenGL is in its fourth major revision, and we will emphasize the usage of the modern, high-performance API, ignoring a great deal of obsolete functionality that remains for backward-compatibility.

| | | | | | | | | |
|-----|-----|------|-----|-----|------|--------|-----|------|
| 1.0 | ... | 1992 | 2.1 | ... | 2006 | 4.2 | ... | 2011 |
| 1.1 | ... | 1997 | 3.0 | ... | 2008 | 4.2 | ... | 2012 |
| 1.2 | ... | 1998 | 3.1 | ... | 2009 | ES 1.0 | ... | 2004 |
| 1.3 | ... | 2001 | 3.2 | ... | 2009 | ES 1.1 | ... | 2005 |
| 1.4 | ... | 2002 | 3.3 | ... | 2010 | ES 2.0 | ... | 2007 |
| 1.5 | ... | 2003 | 4.0 | ... | 2010 | ES 2.1 | ... | 2011 |
| 2.0 | ... | 2004 | 4.1 | ... | 2010 | ES 3.0 | ... | 2012 |

OpenGL supported platforms

MS Windows 7/Vista/XP

Mac OS X

Linux

iOS

Android

Symbian

Nintendo Wii & DS

Sony PS3 & PSP

Blackberry

DirectX

DirectX is the Microsoft real-time 3D API, first released in 1995 as Direct3D. Through 11 major revisions, DirectX has evolved into an excellent API, equivalent in capability to (and perhaps better-designed than) OpenGL.

But... supported platforms:

Windows Xbox

DirectX 10+ supports Windows 7/Vista and Xbox 360 only.

Course software requirements

Most any OS:

- Windows 7/Vista/XP
- Mac OS X
- Linux

“Native” languages:

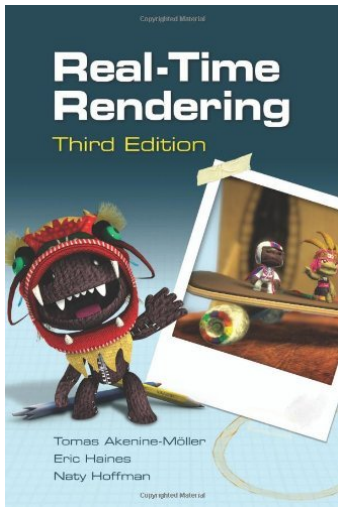
- C
- C++
- *no Java*

Course hardware requirements

Any machine with hardware accelerated 3D graphics...

- Your laptop
- Your desktop
- A lab workstation
- Your instructor's lab workstations

*You will make in-class demonstrations. Be ready. Be certain to **test** before class.*



Real-Time Rendering

Tomas Akenine-Möller

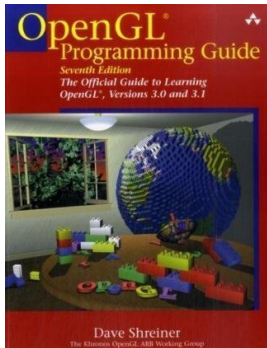
Eric Haines

Naty Hoffman

ISBN 978-1568814247

\$57.70 at Amazon

<http://realtimerendering.com/>



OpenGL Programming Guide

Dave Shreiner

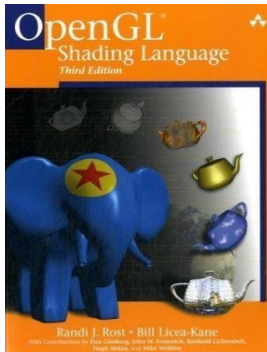
Khronos OpenGL ARB Working
Group

ISBN 978-0321552624

\$40.43 at Amazon

Version 1.1 (old) at <http://www.glprogramming.com/red/>

Standard spec at <http://www.opengl.org/documentation/specs/>



OpenGL Shading Language

Randi J. Rost

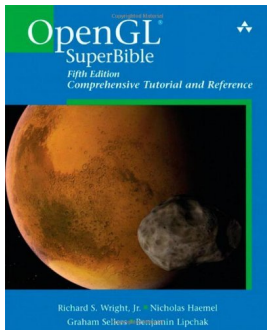
Bill Licea-Kane

et al

ISBN 978-0321637635

\$38.67 at Amazon

Standard spec at <http://www.opengl.org/documentation/glsl/>



OpenGL SuperBible

Richard S. Wright

Nicholas Haemel

Graham Sellers

Benjamin Lipchak

ISBN 978-0321712615

\$37.96 at Amazon

(You really won't need this.)

Course Assignments

Three individual programming projects

- Instructor assigns topic
- Brief informal in-class demonstration

One individual final programming project

- Student chooses topic
- Ten-minute formal in-class presentation
- Grad students will write an additional paper

The schedule is on the web site.

Project Grading

Each project is worth a total of 80 points.

| | | | | | |
|-----|-----|----------------|---|-----|------|
| +40 | ... | Implementation | A | ... | > 70 |
| +20 | ... | Documentation | B | ... | > 60 |
| +10 | ... | Demonstration | C | ... | > 50 |
| +10 | ... | Lagniappe | D | ... | > 40 |

Final Project Grading

The final project is worth a total of 160 points.

| | | | | | |
|-----|-----|----------------|---|-----|-------|
| +60 | ... | Implementation | A | ... | > 140 |
| +40 | ... | Documentation | B | ... | > 120 |
| +60 | ... | Presentation | C | ... | > 100 |
| | | | D | ... | > 80 |

Piled higher & Deeper

The University demands that added requirements be placed upon *graduate students*. Thus, an additional 4-page paper will be required as a part of the presentation of the final project.

On the bright side, the schedule permits

- two extra weeks to finish it,
- and more time to present it.

Semester Grading

The semester total is 400 points.

A ... > 350

B ... > 300

C ... > 250

D ... > 200

Grades will be posted to a spreadsheet on the **course web site**, anonymized using the last three digits of your LSUID.