The OpenGL Shading Language:
Theory and Application

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Course Goals

The goals of this course are to explain both the theory and the application of GPU programming, commonly, and too narrowly, known as "shaders". Specifically, we will look at:

• A more advanced look at the graphics pipeline
• A more advanced look at transformations
• GLSL Vertex shaders
• GLSL Fragment shaders Lighting
• Color interaction
• Opacity interaction
• Step boundaries
• Smooth step boundaries
• Positional and gradient noise
• Fractional Brownian Motion (FBM, 1/f) noise
• The OpenGL Shading Language (GLSL)
• Texture-mapping tricks
• Hiding data in textures
• Bump-mapping
• Cube-mapping
• Spectral effects
• Lens effects
• Image manipulation
• Visualization
• General purpose computing (GPGPU)

Good References

Randi Rost, *The OpenGL Shading Language*, 2nd Edition, Addison-Wesley, 2006.

Alan Watt and Fabio Policarpo, Advanced Game Development with Programmable Graphics Hardware, AK Peters, 2005.

Steve Upstill, *The RenderMan Companion*, Addison-Wesley, 1990.

Tony Apodaca and Larry Gritz *Advanced RenderMan: Creating CGI for Motion Pictures*, Morgan Kaufmann / Academic Press, 2000.

Saty Raghavachary, *Rendering for Beginners: Image Synthesis using RenderMan*, Focal Press, 2005.

Randima Fernando, *GPU Gems*, Nvidia, 2004.

Matt Pharr, Randima Fernando, *GPU Gems 2*, Nvidia, 2005.