

CISC440/640 – Spring 2015
Programming Assignment #4 Due
05/20/15 (before 11:59:59pm)

Objective: In this project you will be asked to implement Phong shading and environment mapping using OpenGL/GLSL Scheme.

Undergraduate and Graduate Students (Required)

1) Modify the Gouraud shading shader to support Phong shading.

2) Modify the per-vertex environment map shader provided in class to support per-pixel environment map shader: Compute the reflected ray direction for each pixel. For each reflected ray r with normalized direction (r_x, r_y, r_z) , we compute

$$p = 2\sqrt{r_x^2 + r_y^2 + (r_z + 1)^2}, \text{ and the texture coordinate is computed as } u = \frac{r_x}{p} + \frac{1}{2} \text{ and } v = \frac{r_y}{p} + \frac{1}{2}.$$

I have uploaded several spherical texture maps onto the course webpage. More images can be found at:

<http://www.debevec.org/Probes/>

You need to test your shader on a graphics card that supports OpenGL 2.0.

Graduate Students Only.

Create your own spherical environment map M using your own ray tracer. Specifically, construct a scene that consists of multiple diffuse objects and render a mirror ball to obtain the environment map. Compare your rendering with the ground truth. To compare the EM result and the ray tracing results, render the reflector (say a teapot) using your own ray tracer. Next, render the reflector using your own code with environment map M . Compare the rendering results from both methods and include a short analysis why EM is different than ray tracing in the submission.