

**Department of Computer Science and Engineering**  
**CSP: 316 Computer Graphics Lab**

**6. Light Illumination and Shading.** Aim is to understand how real-world lighting conditions are approximated by OpenGL. To understand how to render objects by defining light source, material, and lighting model properties. Implement a test bed for experimenting with local illumination models. Store an image that contains for each pixel its visible surface's index into a table of material properties, the surface normal, the distance from the viewer, and the distance from the normalized vector to one or more light sources. Allow the user to modify the illumination equation, the intensity and colour of the lights, and the surface properties. Each time a change is made, render the surface. Show the effect of Diffuse, Specular and Ambient illumination. Your renderer should support Constant, Gouraud and Phong shading models also.

**Assessment:** You should be able to answer the following.

What is rendering pipeline?

The difference between diffuse and ambient light sources.

Effect of material properties on the color of the surface.

Which surface materials produce good specular highlights?

How to approximate surface curvature to avoid mac-band effects?

How to compute surface normal?

How to interpolate shading using Phong and Gouraud shading models?