

CSci 5607, Spring 2022
Assignment 1b: Light and Shadow
Due: Friday February 18th

Name _____

Score (out of 100) _____

_____ The program correctly accepts, from an input file, extended scene information, including: expanded material properties ($Od\lambda$, $Os\lambda$, ka , kd , ks , and n), and multiple point and directional light source descriptions with associated wavelength-dependent intensity information. (5 pts)

_____ In a scene containing a single sphere and a single point light source, the program is able to correctly determine the surface illumination at each ray/surface intersection point where a surface color needs to be computed, using the Blinn-Phong illumination equation provided in class. All necessary unit-length vectors are properly computed, including: the surface normal direction, the direction to the light source, the direction to the viewer, and the direction of the ‘halfway’ vector between the direction to the viewer and the direction to the light source. (10 pts)

_____ In a scene containing a single sphere and a single directional light source, the program is able to correctly determine the surface illumination at each ray/surface intersection point where a surface color needs to be computed, using the Blinn-Phong illumination equation provided in class. All necessary vectors are properly computed, including the direction towards the incoming light, etc. (10 pts)

_____ In a scene containing multiple spheres and multiple light sources, the program is able to correctly determine the surface illumination at each ray/surface intersection point where a surface color needs to be computed, using the Blinn-Phong illumination equation provided in class. Intensity overflow errors are avoided by clamping the total color to 1.0, and negative quantities of light energy are avoided in the intermediate calculations. (15 pts)

_____ In a scene containing multiple spheres and a single directional light source, the program is able to correctly determine whether or not a ray/surface intersection point is in shadow. (10 pts)

_____ In a scene containing multiple spheres and a single point light source, the program is able to correctly determine whether or not a ray/surface intersection point is in shadow. The program does not erroneously allow shadows to be cast by objects that are “behind” a point light source. (10 pts)

_____ In a scene containing multiple spheres and multiple light sources, the rendering is able to appropriately capture the extent to which a ray/surface intersection point is in shadow. (15 pts)

_____ The student has submitted a creatively original “showcase” image, plus sufficient additional images to illustrate the capabilities of their program, along with all of the corresponding input scene files. (5 pts)

_____ The student has submitted a 2-3 page write-up in which they both discuss and demonstrate, using appropriately-derived example images created by their program, how the computed image is affected by the use of different light source types and light source parameters

as well as how each of the different material properties in the Blinn-Phong illumination model affects the surface appearance. Specific points addressed include:

- How the values of k_a , k_d , k_s , n and $O_{s\lambda}$ can be varied to simulate qualitatively different material types (and also, what sorts of materials cannot be well represented by the Blinn-Phong model)
- What phenomena can be represented using a point light source that cannot be effectively simulated using a directional light source

(15 pts)

_____ All of the required deliverables were submitted in a single .zip file, and a Makefile (or equivalent) was provided with the source code for easy compiling. The program is commented adequately well enough to enable easy grading, and is structurally sound in that it does not ‘bomb’ in response to unanticipated input. (5 pts)

For extra credit:

_____ The student’s program is capable of rendering “soft” as well as hard shadows. The student has provided an input scene description that allows this effect to be appreciated, and the effectiveness of their solution can be seen in the corresponding output image produced by their program. The program uses an appropriate number of samples to avoid artifacts. (4 pts)

_____ The student’s program is capable of implementing attenuated light sources. The student has provided an input scene description that allows this effect to be appreciated, and the success of their implementation can be seen in the corresponding output image produced by their program. (4 pts)

_____ The student’s program is capable of implementing depth cueing. The student has provided an input scene description that allows this effect to be appreciated, and the success of their implementation can be seen in the corresponding output image produced by their program. (4 pts)