# CS 405 Project 2: Texture + Illumination

## Instructions

Please Download the assignment content from SUcourse. Inside the folder, you should see the resources folder and 3 files:   
  
project2.html, project2.js, and obj.js.  
  
If you open project2.html in your browser, you should see a screen where you can upload 3D model mesh and texture data to render them on your screen.  
  
In this project, you should complete all 3 tasks to get full points. The 4th task is a bonus task, you will get 30 points extra.

Important note: In order to give you the maximum flexibility I will let you edit the HTML file (no big edit is required anyway) for the Task 3 and Task 4. You can even create separate HTML files for each of them if you prefer.

## Task 1 (30 points)

In this task, you should modify the setTexture method inside the project2.js file.

The current implementation of this method only accepts pictures that have width and height values of a power of two. To allow any sized images to be used as textures, you should modify the following section:  
  
To test whether your implementation supports any sized images, you can try using the image leaves.jpg under the resources.

## Task 2 (40 points)

In this task, you should implement basic lighting for this scene.

The lighting should at least include ambient light and diffuse light. For this task, you should modify the constructor, setMesh, draw, enableLighting, and setAmbientLight methods, and you should modify the fragment shader (meshFS). If you have implemented the light properly, your scene should look like this:  
top, küre, sanat içeren bir resim

Açıklama otomatik olarak oluşturuldu No Lightingtop, basketbol, küre içeren bir resim

Açıklama otomatik olarak oluşturuldu With Lighting

You should also be able to change the ambient parameter by using the “Ambient Light Density” slider to get full points from Task 2.

Additionally, if the light is working properly, pressing the arrow buttons should change the light’s location. Please check the project2.js file for more information about the task 2.

## Task 3: Implementing Specular Lighting (30points)

Introduce specular lighting to simulate reflective surfaces, enhancing the realism of the rendered scenes.

Modify the shader code to calculate specular highlights based on the Phong reflection model.

The specular intensity should be adjustable through a new slider labeled "Specular Light Intensity." This will allow users to experiment with shininess and material properties, making the lighting implementation more dynamic and visually appealing.  
  
Files to modify:  
- project2.js:

Add a function to handle specular light calculations and update the rendering pipeline.  
fragment shader (meshFS): Include specular light calculations using a view vector and shininess exponent.

## Optional Task 4: Supporting Multiple Textures (extra 30points)

Enable support for multiple textures per object to simulate complex materials (e.g., combining a base color texture with a normal map for surface details).

Modify the code to accept and blend multiple textures dynamically and add an interface for users to upload and toggle between textures.  
  
Files to modify:  
- project2.js: Extend the setTexture method to handle and blend multiple textures.