

# CST325: Final Project

This project is to be done **individually** (no partner). Create a WebGL depiction of our solar system that satisfies the following:

## “B” Implementation (85%)

1. Contains appropriately textured spheres representing the sun, earth, moon, and the rest of the planets. These do not need to be to scale but rather just be easily identifiable.
2. The camera should be able to orbit around the sun using the mouse and zoom in or out using the scroll wheel.
3. The sun should rotate around its local up or y-axis.
4. The earth should rotate around its local up axis and around the sun (2 separate rotations).
5. The moon should rotate around its local up axis and around the earth (2 separate rotations).
6. Contains a skybox (not a sky-sphere) with a space-starfield texture.
7. The sun should **only** have **emissive** lighting (i.e. set its final color to the texture color).
8. The planets (and moon) should be lit from a point light located at the sun position and use **only the diffuse** contribution (no ambient or specular).

Note: all of the orbit rotations should happen at **different rates** (e.g. the sun rotates around itself faster than the earth orbits around the sun).

WebGL libraries such as Three.js/Babylon.js are **not** to be used. The code should be constructed using previous assignments as a starting point. I recommend using the point lit illumination assignment solution.

## “A” Implementation (15%)

1. Create the illusion of an atmosphere around the earth by using a slightly larger semi transparent sphere around it (use a cloud texture).
2. Add the ability to switch between the default orbit camera and one that follows the earth while aiming as it orbits.

## Bonus

- Make the stars in the background twinkle – fade in and out quickly (non-uniformly). +5
- Use a shader to make the sun color vary non-uniformly over the surface and change over time. +5
- Draw a line that shows the orbital path the earth takes around the sun. +10
- Make the earth texture blend from day and night textures based on its normal direction compared to the direction to the sun +10
- Create a comet that occasionally moves through the solar system and leaves a particle trail behind it as it moves +20
- Use raycasts inside the earth and moon shader to determine if it is in shadow. +30
- Add shadows using shadow mapping (for point light, requires 6 shadow passes) +30

## Submission Instructions

Include a readme.txt file in your .zip file containing your name along with answers to the following:

1. What was your favorite topic or project in the course and why? (1pt)
2. If you could improve any aspect of this course, what would it be and why? (1pt)
3. If you could go back in time to the first week of class and give yourself advice on how to best navigate this course, what would it be? (1pt)