Final Submission

Team Number: 26
First Names of Team Members: Gabriel, Spriha, Clara, Elias & Emily

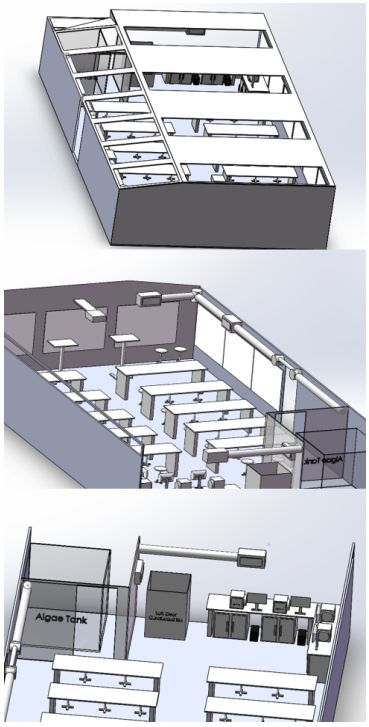
Task #1: Discovery (maximum 100 words)

Our design studio, *The Shelby Studio*, aims to optimize the health of students. Common problems include poor air quality, lack of natural light, low functionality and poor insulation. Our studio prioritizes student comfort with the 6'x6'x5.5' algae tank to maintain air quality, skylights for natural light and heating (greenhouse effect), hempcrete insulation and whiteboard-covered walls and moveable chairs/tables to maximize student mobility. The algae can also be a resource to provide research opportunities for students throughout the campus. *Shelby* will be located behind the Biology Greenhouse and this Studio is created for Chemical and Biomedical Engineering Students.

Task #2: Innovation (maximum 100 words)

Shelby uses large fish tanks, water, sunlight, and a constant supply of CO_2 from the classroom itself to efficiently release clean, oxygenated air into our studio. To ensure algae growth, a thermostat will maintain water temperature and repurposed vent filters will be used to remove algae from the tank. Moreover, *Shelby* was designed using eco-friendly hempcrete insulation, skylights and led lighting to minimize electricity costs, easily movable desks for students and instructors to facilitate student collaboration, a used material drive to encourage repurposing materials, and whiteboard covered walls equipped with rocketbook beacons to foster students' learning.

Total: $78,883.99



Task #3: Sustainability (maximum 100 words)

Algae's high lipid content and rapid growth can be used to produce biofuels that reduce carbon emissions by 50-70% compared to petroleum. *Shelby*'s feedback loop intakes CO_2 and outputs algae that are used by external facilities to synthesize biofuels/design materials for the studio. This continuous system eliminates the studio's CO_2 and simultaneously resupplies its electricity and materials. *Shelby* sources water from McMaster's Engineering Technology Building's rainwater harvesting system. A carbon detector will monitor the studio's air quality monthly. A tracking sheet for the used material drop off box allows students to record the gross number of recycled materials.