In this project we modeled the optical characteristics of LEDs that make up a Solar Simulator Module, or SSM. The project simulated the performance of the multiple different types of LEDs contained in an SSM using 3D optical modeling tool. An SSM generates an optical spectrum similar to solar rays through the use an array of high-power Light Emitting Diodes (LEDs). One use of an SSM is for testing photovoltaic cells. Solar simulators allow cells to be tested without having to expose the cells to the elements before they have to. Current technology for this kind of testing relies primarily on sulfur plasma lamps and xenon arc lamps. Both of these halogens bulbs take around five minutes to heat up and five minutes to cool down, which loses energy. Furthermore, the bulbs have about a 6 month life span, so there is a lot of waste material wise. LEDs, however, have extremely long lives (some still exist from the 1980s) and have no heat up or cool down times. Furthermore, LEDs can be pulsed or flashed between each tested cell to further save energy costs. However, the issues with an LED solar simulator is that they don’t do a very great job of representing the spectrum of the sun and also have a hard time keeping a uniform intensity as the surface area of the light gets bigger. Another group at Calvin is working on the former problem, and our group is working on the latter. We are using optics software to find the optimal placing of the LEDs to give the most optimal and uniform output, while still finding software that can be used by the other group to analyze the wavelength spectrum. This opportunity has given me the chance to grow academically, but furthermore it has allowed me to personally think about sustainability in my own life. The goal of this project was to find the optimum layout for multiple arrays of LEDs in order to generate a uniform spectrum and intensity over a square 125 mm on a side. An SSM must provide a light output with a spectral intensity similar to solar rays to properly test photovoltaic cells. Ideally this light output is provided with a uniform spectrum and intensity over as large an area as possible in order to facilitate testing of a large number of cells at one time (in, for example, a production setting). This project worked to develop an understanding of the parameters that affect uniformity and optimize their values. Potential parameters that affected uniformity and intensity were the how the LEDs are spaced, the number of LEDs used, their pattern of arrangement, and the angle at which they are mounted. This project involved a literature and tools search, designing and documenting measurement techniques, developing a model to optimize LED parameters, and testing and refining the model through simulation and comparisons with actual performance. After looking at past researchers work and further trying to understand the problem, we began to search for a software that could model the problem and do the analysis we needed. After an extensive search with many trial licenses, we found that LightTools, an optics software, was the best option. Then using LightTools, we began to optimize the board to by looking at the wavelength and intensity and changing the placements, intensities and the viewing angle to optimize the system. We began to make initial designs for the placement of LEDs on the board. The experience I got this summer was great! I know it will help me both for grad school and industry. Furthermore, I got to better understand sustainability concepts.