Student Summer Scholar Program Application Examples

A2. Student Preparation and Motivation

Example 1

Preparation: I came to be involved in this lab throughout the Winter 2022 semester and the Spring/Summer semester. I had reached out to several cell and molecular biology professors about being interested in their research and wondering if there was any opportunity to get involved. During the Winter 2022 semester I was enrolled in CMB 156 and 250 with Professor [redacted]. We met several times over the semester to discuss research papers regarding cell-signaling and light regulation in *Arabidopsis thaliana.* Over the Spring/Summer 2022 semesters I worked 5-10 hours a week in [redacted] lab at [redacted], where we began a research project. The goal of this project is to delete Region 2 or Region 3 (separately) of the light-regulating BTB (LRB) cDNA, then transform the mutated LRB genes back into *Arabidopsis thaliana* to analyze how the lack of Region 2 or 3 affects red light responses. Over several generations, we will select for homozygous plants containing the mutated LRB cDNA and evaluate how each plant line functions. The methods we will be using are site directed mutagenesis, gene cloning LR reactions, bacterial transformations, colony PCR, gel electrophoresis, transforming plants through infection with Agrobacterium, selecting for successfully transformed plants, self-crossing plants hemizygous for the mutated LRB gene, then selecting plants that are homozygous for the mutated LRB gene. Once homozygous plants have been selected for and grown, we will be testing their responses to red light in order to determine if Region 2 or 3 are necessary for proper growth and development in reaction to red light.

I understand my role in the project as a consistent student researcher working full time in the lab to advance the project. I will be performing the site directed mutagenesis, gene cloning, plant transgenic work, and phenotype testing of the plants.

The preparation I currently have for undertaking this project is completion of CMB 156 and 250, CHM 116, PHY 221, STA 215, BIO 375 and 376, and CHM 241. I am currently in CMB 405, 406, 409 and CHM 242. Additionally, I have earned a CMB 499 credit due to my work in Professor [redacted] lab, and I have also spent time studying several research papers related to cell-signaling in *Arabidopsis* that provided me background on this project. These courses and time spent in Professor Christians' lab have allowed me to practice and gain skill with lab techniques essential to our project such as PCR, transformations, selecting for transformed organisms, and data analysis.

Scholar Development: My academic journey has always centered around research. I entered my freshman year at GVSU majoring in Cell and Molecular Biology with the goal of attaining a PhD and entering pharmaceutical research in the future. As I attended classes and completed coursework, I became further interested in chemistry as well as biology, and decided to double major in biochemistry as well as CMB. Working in Professor [redacted] lab has been a major part of my academic journey, as I have been able to develop a more practical understanding of how the lab techniques I learn in class apply in actual research. I have also learned how to troubleshoot lab protocols and analyze potential sources of error in a more complex research project than I experienced in lab classes.

This research project supports my academic progression by providing me further opportunities to practice various lab protocols and maintain a lab notebook. This project would also enhance my academic and professional goals by introducing me to new skills, such as transforming plants through Agrobacterium infection and selecting for the desired genotypes. I will also practice and learn how to write and develop a research poster and present this project to others. Being able to explain and answer questions about research I have done to others is a skill that will greatly benefit my academic goals.

Learning Goals: My expectations of this mentored research project and scholarly experience is full-time work in the lab, where I focus on gene cloning in the beginning of the summer and plant transformation and selection later in the summer. I expect to practice and perform skills such as PCR, gel electrophoresis, and bacterial transformation. I also expect to be able to ask questions about those procedures if necessary, and to learn from Professor [redacted] how to transform plants with Agrobacterium and select for the desired genotypes. I anticipate being challenged to analyze errors and results and work independently more often over the course of the summer.

I excel in a learning environment where I am able and encouraged to ask questions if I am confused or need clarification. I also appreciate being able to observe someone complete a task that I haven't done yet before I am asked to do it on my own. I work best with clear instructions or a protocol that I can use, and with one or two goals to accomplish at the same time. I struggle when there are multiple goals to complete at once, or the protocol for an experiment is vague. I also have difficulty when there is no opportunity for me to ask questions.

The actions I will take to mitigate the above areas of struggle are to talk to Professor [redacted] about his expectations and plans for the summer mentorship, and ensure that I have time to ask questions. I will also study and review the protocols I will be using during the summer so I am prepared. In order to prevent confusion or mistakes when I am performing multiple tasks at once, I will work on maintaining a clear and organized lab notebook with detailed procedures and data tables, so that I can easily follow instructions for various protocols at the same time.