

# **Final Reflection on My Summer Enrichment Experience at the Michigan Math and Science Scholars Program**

*by Zoya Chowdhury*

“Human minds are more full of mysteries than any written book and more changeable than the cloud shapes in the air.”

— Louisa May Alcott

This quote by Louisa May Alcott encapsulates the essence of my journey at the Michigan Math and Science Scholars (MMSS) Program. It speaks to the vast potential within each of us, the endless possibilities of our thoughts and passions, and the ever-evolving nature of our interests and dreams. My time at MMSS has been a profound exploration of these mysteries within myself, as I sought to uncover what I truly wanted to do for the rest of my life.

## **Reasons for Attending the Program**

I attended the MMSS program for various reasons. Primarily, I wanted to experience independence—living by myself, managing my schedule, and attending classes every day. More importantly, I sought to learn more about myself and what I love. I hoped to gain insights into what I want to do with my life. The Garwin Family Foundation's support enabled me to pursue this experience, and it has been incredibly rewarding.

## **Academic Experience and Learning**

The Surface Chemistry class has been a cornerstone of my time at MMSS. The lectures covered a broad spectrum of fascinating topics, each more intriguing than the last. My favorite lecture was on biomaterials, where our professor discussed artificial hearts and other organs. This lecture significantly reinforced my interest in biology and medicine. The detailed exploration of bio-interfaces and the potential of biomaterials to revolutionize medicine was truly inspiring.

In the biomaterials lecture, we delved into the complexities of artificial hearts, exploring their design, functionality, and the challenges in making them biocompatible. Our professor explained how these artificial organs could potentially save countless lives by providing a solution to heart failure, a condition that affects millions worldwide. The integration of bio-interfaces in these devices aims to ensure that they work seamlessly with the human body, reducing the risk of rejection and improving overall patient outcomes.

Another captivating topic was infectious diseases, with a focus on COVID-19. Given the global impact of the pandemic, understanding virus detection and prevention methods was particularly relevant. We discussed the mechanics of different at-home testing kits and how professional virus detection tests work. Our professor provided insights into the various technologies used in these tests, including PCR (polymerase chain reaction) and antigen tests, which have been crucial in managing the spread of COVID-19.

Vaccines were another key area of discussion. We learned about how vaccines work and the different methods used in various countries. For instance, in the United States, vaccines typically introduce antigens from a bacteria or virus to prompt an immune response. In contrast, China often uses inactivated or dead viruses in their vaccines, allowing the body to produce antibodies without causing the disease. We also learned about the option in the U.S. to receive vaccines that inject antibodies directly into the body, although this method is unfortunately too expensive for widespread use.

Microscopy and spectroscopy were other topics that piqued my interest. We explored different types and their histories, learning about when they were introduced and how they influenced other methods. Techniques such as PALM (Photoactivated Localization Microscopy), IR (Infrared Spectroscopy), STM (Scanning Tunneling Microscopy), and AFM (Atomic Force Microscopy) were discussed in depth. Understanding these technologies provided a comprehensive view of how scientists can observe and analyze materials at the molecular and atomic levels, which is essential for advancements in various fields of science and medicine.

Additionally, our professor's research presentations were equally captivating. He discussed his work with enthusiasm and depth, covering various topics and methodologies. We even had the privilege of touring his wet and dry labs, where we saw many of the instruments used in his research. This tour was a highlight for me, as it provided a hands-on understanding of the tools and techniques used in cutting-edge scientific research.

## **Hands-On Labs**

The hands-on labs were, without a doubt, my favorite part of the program. We engaged in a variety of experiments, from creating nylon synthetic fabric and adhesives out of milk to extracting pigments from spinach and performing titrations, inorganic synthesis, and pH measurements. Using the FT-IR instrument to collect information about various chemical substances was particularly fascinating. These labs provided a level of practical experience that I had not encountered before, even in my previous lab work at SIU. I found the independence and direct involvement in these experiments to be incredibly fulfilling.

## **Group Presentations**

Surprisingly, I also enjoyed the group presentations. Initially, I was apprehensive about working with new people and presenting complex topics, but the experience turned out to be very rewarding. Our group presentations on adhesion and Infrared (IR) Spectroscopy allowed me to dive deep into these subjects and improve my presentation skills, especially concerning scientific topics. Meeting new people through these group activities was another unexpected benefit, as it broadened my social network and provided new perspectives.

## **Campus Life and Social Experiences**

Outside of class, the free time on campus was a delightful aspect of the program. With breaks between sessions, I often spent my afternoons walking around downtown Ann Arbor with friends. We explored various stores, dined at different restaurants (including an amazing taco place we visited three times and my favorite, Noodles & Company for pesto cavatappi), and even enjoyed a private viewing of "A Quiet Place: Day One" at the local movie theater.

A standout experience was the Ann Arbor Art Fair, which started later in the second week. We spent hours wandering through the fair, admiring the stunning pieces of art on display. Although we didn't manage to see everything, the experience was a beautiful reminder of human creativity and the mysteries of the human mind. The fair showcased the incredible range of artistic expression, and while I am not a creator myself, I deeply appreciate the work of others.

## **Conclusion**

Overall, my experience at the Michigan Math and Science Scholars Program has been incredibly enriching and transformative. The combination of rigorous academic content, hands-on labs, and vibrant social experiences has solidified my career aspirations in medicine. Additionally, I now have a clearer understanding of my passion for chemistry and the practical aspects of scientific research.

Thanks to the Garwin Family Foundation, I have been able to explore the mysteries of my own mind, much like Louisa May Alcott's quote suggests. This journey has illuminated my path forward, providing clarity and direction for my future endeavors. The experience has been invaluable, and I am deeply grateful for the opportunity to participate in this program. As I move forward, I will carry the lessons learned and the memories made, always mindful of the infinite potential and mystery within the human mind.