

Final Reflection on My Experience at Stanford Pre-Collegiate Summer Institutes

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I spent three weeks this June and July at Stanford University in the Pre-Collegiate Summer Institutes, where I took a course entitled “Astrochemistry: The Study of Life in Space.” The class focused on the different types of molecules present in space and various methods of identifying them. It culminated with a paper and a presentation on a topic relating to space, such as: habitability, exoplanets, colonization, etc.

Class Time

In a two-and-one-half-hour period between breakfast and lunch on Monday through Friday, we attended class taught by Dr. Partha P. Bera, a researcher from the NASA Ames Research Center. The first week was spent on material from classes at school and important background topics for astrochemistry, as well as brief discussions about the formation of stars and stellar systems.

We got into the real meat of the course the second week, when we discussed discovering materials in space via spectroscopy. Spectroscopy is a massive topic, and what we learned was only a snippet of a much larger area of study. However, out of those lessons, I got a sense of the utility of these methods, as well as the extreme challenges in using such a wide data set to arrive at specific answers.

The final week was spent learning about how molecules, from water to amino acids, can form on microscopic dust grains in space. And we concluded with a brief overview of the conditions of certain moons in our solar system, most notably Titan and Enceladus.

In all honesty, this was a challenging class for me. We covered a large amount of material very rapidly, and the subject matter was quite dense. Fortunately, we had a few days that were less demanding, such as when we went on a short hike to see the massive dish on Stanford’s campus that’s used to detect some of the emissions we discussed in class. Still, I got through the class successfully, and I was happy that I could attend it.

Afternoon Study Sessions

After class was lunch, and after lunch came our three-hour group-study session. Generally, we started these sessions with a bit of homework that we worked on independently or in a group, depending on difficulty. At the beginning of the three weeks, the counselors leading our group

would fill the rest of the time with short lessons on a chemistry topic, such as graphene. After the first week, however, our research project took up the majority of the study time.

For my paper, I looked into early planet formation and the criteria a planet must meet to be potentially habitable in the future. That project was rough. The days seemed to alternate: on one day, I would have an easy time writing a section, and, then the next day, writing would seem impossible. Although it was a bit stressful, I got through it, and, in the end, I was satisfied with my work. It wasn't perfect; for instance, some of my earlier paragraphs needed more focus, and my presentation was wordy and could have used better visual aids. But I did a decent job overall. Despite the challenges, it was a good experience, and, to be honest, it's the kind of thing that I wanted out of this course. If I wanted it to be easy, I wouldn't have applied in the first place.

Afternoon, Weekend, and Evening Activities

While education was the primary focus of the program, it wasn't all work and no play. After our study session, we would take a quick break before spending an hour on an activity. Activities varied from day to day, with around seven activities from which to choose. Some of the activities, I chose included: creating tie-dyed shirts, visiting Stanford's arts center, taking a bus to downtown Palo Alto, and competing with the other dorms in various competitions. Almost all the activities were great, and the sheer variety of kept any of them from becoming stale.

The real highlights, however, came on Saturdays, when much larger activities were planned. Our first Saturday was spent at the beaches in Capitola, CA. I got to swim in the Pacific Ocean for the first time! For the record, it was absolutely freezing. After that, some friends and I had a chance to explore the part of town surrounding the beach. That day at Capitola was matched by our second trip to a science museum in San Francisco. The museum was full of great exhibits, but the standout was an astronomy show that was projected onto the walls and ceiling of the theater. It's hard to describe, but it blew me away.

In the evening after activities and for the entire day on Sundays, we had free time until lights out. During the program, I got to know eight or nine people really well, and I generally spent my free time with some or most of this group. As a group, we played a lot of board games. We started out with *Settlers of Catan*, but we had so much fun playing as a group that we printed out another game and had four more mailed to us. It was such a great time! We did a few other activities as a group, as well, such as hiking, visiting Hoover Tower (the tallest building on campus), and watching films. One of my favorite parts of the experience was when two friends and I watched *Casino Royale*. Another time, we hung out and sipped a collection of the worst soda imaginable; the flavors were, no joke: PB&J, Buffalo Wing, Ranch Dressing, and Bacon! They were abhorrently bad. But my friends were good sports, and we had a laugh about our mutual

suffering. Over the course of my three weeks at Stanford, I got to know a fantastic group of people. They were intelligent, humble, and, above all, fun to be around!

Wrapping Up

I think I've made it clear how much I got out of this enrichment experience, so I would like to briefly mention one other aspect of the program: the counselors. They were phenomenal. The counselors that led my class's study sessions helped explain and review chemistry and physics concepts that were critical to the course. When I hit a roadblock in locating information for my project, they helped me to find new articles, and they even checked out a book from the Stanford library for me. Beyond that, all the counselors were always helpful and friendly, and I would sincerely like to thank them for making the program so great.

My instructor, my counselors, my friends—all of them—helped make this one of the greatest things I have done in high school. Before I left, I was honestly terrified about travelling across the country to live for three weeks with a group of people I'd never met before. In retrospect, I don't regret a single second of my time at Stanford.

Finally, I want to thank my parents for supporting me before, during, and after this program, and I would like to thank the Garwin Family Foundation for sponsoring my entry into it.