In the first week of COSMOS, Cluster 6 has begun exploring the organic chemistry involved in making biodiesel.

“Sunday was the first day of COSMOS. After registering, we dropped our possessions off in our rooms and left to attend the opening ceremony where we met the staff and the residential advisors for our suites as well as the advisors for cluster 6, Harold and Alejandra, who led us on a tour around campus. Afterwards, we returned to the large lawn in front of the dorms where we played a few ice breaker games and met our Teacher-fellow, Mr.T. We then ate dinner, which was followed by a few rounds of ice breaker games with the collective COSMOS body; a portion of time where we engaged in “controlled chaos,” enjoying such games as Oh Captain My Captain and a Pitch Perfect-Style Riff-off. We then dispersed into our suites after singing happy birthday to 2 fellow students. Once we arrived back in our suites, we crafted community guidelines and reviewed the rules of the camp.”

Aaron Lin

“Monday was our first full day of classes. We were introduced to Dr. Pomeroy and he led our first lecture of the course about energy and the reasons behind the importance of renewable energy. After lunch at 64 Degrees (which had really good Chinese food), we were able to go right into the lab and begin making our biodiesel. I had personally never had such hands-on experience in a lab which made it even more fun for me. The teachers are all very passionate about what we are doing and commit themselves to helping us understand, not only the procedure, but the chemistry behind the projects. After lab, all of the clusters met outside of the dorms to begin practicing for COSMOlympics. Our cluster is going to be performing a rap battle/dance battle between "Petroleum" and "Biodiesel." Yes, it is going to be as funny as it sounds.”

Adi Ralls

“Just like all the other clusters, we started with a lecture from Professor Kanté about the innovating and new technologies used to apply cloaking. It was the first time that many of us had been to a lecture and gave us a taste of a college education, compared to a high school one. This lecture had been the perfect opportunity for us to learn about improving our presentation communication skills, a topic that, with the guidance of our teacher fellow Mr. Towler, we discussed in order to prepare for the presentations that our group have at the end of these four weeks. Following that was, in my opinion, the most exciting part of our day: the first time we got to form our groups and start our final projects. Cluster 6 had five different project topics, giving everyone a chance to try something that they were interested in. Our topics included the creation of soft foam for flip flops, harder foam for surfboards, an additive to improve the quality and efficiency of biofuels, tests to foreshadow the destruction of algae ponds from bacteria, and particle counting. Learning more specifics about our project has only continued to make us more interested in the necessity for biodiesel and what a tremendous impact it will make to our future, and doing it with the best cluster makes it even more interesting!”

Akanksha Sancheti

“Wednesday, Dr. Pomeroy taught us about bonds and explained to us how and why our biodiesel reaction worked. It was interesting to sit in an actual auditorium and learn from a real college professor. Moreover, we could see how much or how little our chemistry classes back home had taught us. Today, we started washing and purifying our biodiesel in the lab. Washing was accomplished by pouring water down the sides, which would capture particles of our catalyst and flush them out. Technically, we have actual useable biodiesel now. After class, we prepared for COSMOS Olympics by planning and dancing. It really looks like it’s coming together now. Plus, it’s fun. COSMOS Olympics is in two days so everyone is hyping up. There was also fruit snacks and those were good too. For mandatory recreation, I drew with chalk. Overall, not a bad day.”

Alex Mantong

With our first week well underway, we’ll next be using an array of instruments to analyze the properties of the biodiesel we’ve made. We have lots of experiences still ahead of us, and we’ll have a great time with the adventure.
Captain’s Log: Andrew here. At our first lecture, we learned about the library resources available for us on this ship. After the presentation, we visited the bookstore, where many crew members bought clothes to avoid doing laundry for as long as possible. After visiting the bookstore, we stopped for coffee and then headed straight to the lab. At the lab, everyone presented which topics they would write about, and we practiced our presentation skills. Then, we worked on our group projects. My group made polyols from algae oil and jatropha oil, and now I feel like I’m starting to understand the material more with repeated exposure to concepts of organic chemistry. After eating our supper at Cafe V, programs proceeded as usual, with the highlight of the ice cream social. Overall, today was great, and I’m looking forward to more adventures on this voyage. - Andrew Chen  
Friday was an interesting day for Cluster 6. After a grueling week of creating soybean biodiesel, many of us discovered that the solution that we had created was impure. When heated to remove water, a mysterious snot-like soap residue would form inside the biodiesel, indicating that more washing was required. Several of our lab mates were able to purify their biodiesel in one try, and continued on to two tests to analyze their biodiesel. The first was a density meter which measured the density of the biodiesel. Second, we had to test the amount of water using a Karl Fischer Titration. These two tests helped determine the validity of our biodiesel and are the first of many. But for the rest of us, Friday meant putting our biodiesel once again into our separation flasks and using water to remove impurities. - Andy Ju  
During our lecture on Monday, Dr. Pomeroy taught us about the three different forms of fossil fuels and how they all possess several advantages and disadvantages. Ultimately, Dr. Pomeroy’s lecture today reinforced the reason of why it is so important to conduct research and find alternative sources of energy such as biodiesel. After eating a great lunch and playing several matches of ping-pong, we went to York Hall, where we continued to wash, dry, measure the water concentration, and measure the density of our biodiesel. With boundaries finally extended, many of us went to Price Center to get boba drinks after lab time was over. Overall, it was another great day with Cluster 6. SHAKA!!! - Brian Nguyen  
Tuesday at Cosmos began with a discovery lecture from Dr. McGinnis in the morning, which talked about genetics and recombinant DNA. Our cluster separated into their project groups after lunch; my group is testing particle concentrations and how different areas have larger particle levels than others depending on the current situations. My group went around and tested particle sizes levels in various areas and we found that construction is three times worst for the air then the particles coming from the backend on a bus. We also washed some algae biodiesel which will be used in a diesel generator so we can measure the particle output. This week has been a blast and I cannot wait to see how our project turns out. - Cameron Chen  
Wednesday, my cluster attended a field trip to a marine hatchery and aquarium with cluster 3. Upon arriving at the Hubbs-SeaWorld Marine Hatchery, an institute which raises White Seabass for release into the wild, my cluster began touring the facility with a researcher working at the location. We explored the various tanks filled with fish ranging from an inch in total length to those larger than an average person. My cluster was also able to enter the lab and see how the marine biologists used techniques that we had learned to conduct cutting edge research. After finishing our tour at the hatchery and enjoying lunch with a view at the Torrey Pines glider port, my cluster and cluster 3 traveled to the Birch aquarium, which is run by the renowned Scripps institution of oceanography. One of the most notable exhibits was the one dedicated to global warming and its effect on marine life. This sobering display showed various impacts that climate change had on marine organisms, such as coral bleaching, and several statistics which stated that global warming would only increase if modern society continued on its current path. It gave meaning to the research that my cluster is doing in clean and renewable biofuels and inspired us to work harder to try and reach a solution to this global problem. - Charley Wang
On Thursday morning, Mr. Towler led our cluster to Center Hall for cluster presentations. The professors from clusters 2, 3, 6, 4, and 1 told us all about their projects and what was going on during class. After the presentations, we headed over to the fourth floor of Bonner Hall to get inspiration for our presentation posters. For the rest of the morning, Mr. Towler talked about our ethics essay, which I’m having so much fun writing, and our projects. After lunch at 64 degrees, we went to York Hall and split into our groups for our final project. My afternoon consisted of waiting for my polyol to separate from my aqueous layer and stressing over the quiz Jack was going to give us. Overall, it wasn’t a bad day.

—Emily Qi

On Friday, Dr. Pomeroy lectured on the different forms of energy and cleared up misconceptions on the difference between heat and temperature. We reviewed calorimetry calculations, conversions between different units, and enthalpies. During the afternoon lab, the cluster split into several groups, and each group analyzed their biodiesel with various instruments in the lab. My lab partner and I used a bomb calorimeter to find the energy that our biodiesel produces when combusted. Several thick metal containers compose a bomb calorimeter. Two wires connected to electrodes lightly touch the surface of a small cup with one gram of the sample. The wires deliver the electrical charge that heats up the sample, which transfers its heat to two liters of water that surround the container. As the calorimeter runs for 500 seconds, a computer takes a live feed of the water temperature in the calorimeter. We use a calorimeter constant that we calculated from running a tablet of benzoic acid through the calorimeter to calculate the total energy that the biodiesel produced.

—Garrett Ma

Monday started in the Natural Sciences Building with a three-hour lecture by Dr. Pomeroy. As every Monday, Wednesday, and Friday goes, it was an interactive lecture of just us twenty students, and we learned more and more about enthalpy change, calorimetry, and how more chemical and physical properties of our biodiesel can be analyzed. The subject, though complicated, was helpfully made more clear through Dr. Pomeroy’s relaxed presence in the classroom setting that does not express any feelings of intimidation. After we enjoyed lunch at 64 Degrees, we learned more about how to analyze our biodiesel and the specific properties our biodiesel holds. My lab partner and I learned that our biodiesel would be compatible in the tank of an airplane in the future because its cloud point (temperature point at which the fuel starts to solidify) is relatively low at -2 degrees Celsius, which was great news to us! Great day overall.

—Jaeyoung Choi

Our third Wednesday began with a lecture from Dr. Pomeroy as usual. By this point in COSMOS, we were done with learning about the concepts needed to understand the properties of biodiesel. So, we moved on to discover the instrumental techniques. Our focus today was on gas chromatography. After a delicious lunch at 64 degrees, we headed on to the lab at York Hall. Like previous lab days, we separated into lab groups and continued on our biodiesel testing procedures. Our group used the FTIR instrument, which uses infrared radiation, to test our biodiesel. After testing, we created an excel spreadsheet to record the data. We were amazed at how sophisticated the instruments were. I am looking forward to the remaining days with my cluster!

—Lauren Park
CLUSTER 6: BIODIESEL FROM RENEWABLE SOURCES

Our third Thursday began with cluster exploration lectures from the professors of Clusters 5, 7, 8, and 9. Each of these professors explained what their clusters have spent their time doing, what their students have been learning, and the final projects they will present in a little over a week. After that, we received a very unfortunate announcement: in light of somebody setting off a fire alarm last night and other disciplinary issues, the boundaries where students could go were massively restricted, reverting back to how they were on the first week of the program. On a brighter note, in Cluster 6 we had a bit of time to work on our final projects; my group managed to write a storyboard for our PowerPoint presentation and plan out most of the contents of our poster. After lunch we all went to York lab to work on our final projects. Many groups are close to finished collecting data, and ready to analyze their findings. After class every student returned to ERC by 4:30. Programming included swimming and having a brief discussion about consent. - Matthew Alexander

For our Friday Lecture, we learned about the ideas and instruments of Mass Spectrometry and Spectroscopy. It was an important thing to learn because we will be using these machines in college, if we decide to go into the field of chemistry. Learning about these machines give us head-start in the long-run. After our long lunch, we went to Chem research lab at York Hall where we continued to test our biodiesel. My group worked with the FTIR which helps identify compounds and determine compound concentration in the solution. We compared our biodiesels to other fuels, both with diluted biodiesel and regular diesel. These tests also help us with our experience in these instruments and experiments.—Nikolas Aquino

Starting the week off, we took the shuttle around 9 am Monday to the biofuel algae field station. There, we met Dr. Pomeroy, and he gave us a tour of the facilities. Dr. Pomeroy explained how field stations allow projects to run at a greater scale and in more realistic conditions than a laboratory. The greenhouses, ponds, and piping were all put together by UCSD students. Dr. Pomeroy emphasized the importance of interdisciplinary skills when conducting research, as everything from construction to computing is needed in the setup. The algae are cultivated in stages, starting from the greenhouse, and they are moved around once they achieve high enough population density. Back at NSB, we sat for our final Cluster 6 lecture, and after lunch we visited York Hall as usual to finish our biodiesel testing.- Russell Tran

Tuesday we went to our last discovery lecture of COSMOS. Dr. Tao taught us about how nanotechnology applies to everyday life. After lunch, we finally got to test our polyols to create soft foam. Our group decided to vary the amount of catalyst to assess the differences in the physical qualities. It was stressful in the beginning to make foam, since the procedure was very time sensitive. However, after several tries, we got used to the procedure and we were able to conduct it with efficiency and precision. Best news for everyone: Boundaries were lifted! Everyone cheered and our cluster celebrated with boba. Brian took a lot of artsy pictures around campus and we were being supportive by being his buddies. Overall, we had a great day, and we are all excited for the rest of the week, since we can finally explore around the campus! - Saehui Hwang

COSMOS is nearly coming to a close. Everyone is hard at work on their final project presentations and posters. We spent the whole day in the lab wrapping up experiments and working on presenting. Now we take what we have learned about renewable resources, organic chemistry, and economics and boiled it down to something we can communicate. Time flies and we have all learned so much. We have a deeper understanding of reaction mechanisms and data collection techniques. It seems like yesterday when we were struck in awe that we made biodiesel on the first day. Now, we have to savor the short sweet time we have with the people we’ve met and just enjoy these last three. Tristan Yoo

Time is flying. This is the last Thursday we have in COSMOS; we only have three days left. It goes without saying that everyone has spent so many unforgettable days here that we are loath to leave. In this morning, all of us went to the Natural Science Building by shuttle as usual. Since all the groups finished the experimental part of the final project, we began to focus on our presentation and poster in order to finish off today. Even though Room 2311 was filled with an atmosphere of both tenseness and sadness, we all enjoying the last a few hours to work with each other and trying our best to perfect our presentations. I am so glad that I chose Cluster 6 to meet with you all. I hope all of us will do a great job on Friday and Saturday so that our effort in COSMOS will culminate in a faultless stop. Looking forward to see you all again! Julia Chen

We’ve had a great four weeks in COSMOS Cluster 6. We’ll be finishing up presentations on Friday and presenting to the Faculty. We look forward to presenting all the accomplishments of our work to families on Saturday. I’ve enjoyed working with all the members of Cluster 6 this year.—Mr. T