COSMOS UC San Diego

California State Summer School for Mathematics and Science

UC San Diego JACOBS SCHOOL OF ENGINEERING

A RESIDENTIAL ACADEMIC EXPERIENCE FOR TALENTED HIGH SCHOOL STUDENTS AT UC SAN DIEGO

Week 4 Newsletter

In this issue:

CLOSING DAY AND BEYOND...

The four weeks of COSMOS seem to have flown by this summer. Faculty, teacher fellows, cluster assistants, residential life staff and office staff have worked hard all year to provide a unique opportunity for students to grow and excel both academically and socially. Over half of our students this summer will be entering their senior year of high school this fall and will have a much better idea of what's ahead as they complete their college applications. Hopefully some of our students from this summer will return to UCSD for their college experience. If you do, stop by our office and say hi! Many of our cluster assistants and residential life advisors were COSMOS students within the last two to three years and are now undergraduates at UCSD. For most of these COSMOS alum, their time at COSMOS remains a special memory and time, one that they are excited to give back to. Perhaps that will be you!

Photos from the summer:
https://drive.google.com/open?id=0B9bdHheZ2k6TTkx1TmVlYTQ2Tnc

COSMOS ALUMNI Yes...that's YOU!!!

Now that you're a COSMOS Alum, please stay in touch and check back regularly for information about alumni events and internships:
http://www.jacobsschool.ucsd.edu/cosmos/alumni.shtml

Continue to support COSMOS by donating!

Please visit: http://cosmos-ucop.ucdavis.edu/

COSMOS RECRUITMENT

COSMOS alum are our best ambassadors. If you would like to help promote the COSMOS program in your area, contact us at cosmos@ucsd.edu.

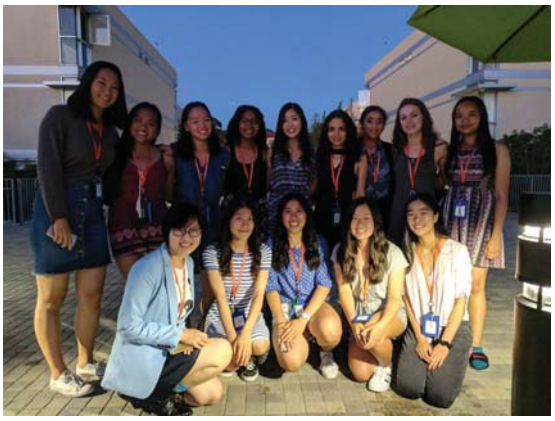
DISCOVERY LECTURE SERIES

Dr. David Pride gave an interesting lecture titled "The Human Virome" for the fourth and final Discovery Lecture in our series. Dr. Pride's major interests are in developing diagnostic tests for infectious diseases and in understanding the role of microbial communities in human health and disease. He joined the faculty at UCSD in September of 2010. His laboratory focuses on the role that microbial communities play in human homeostasis, health, and disease. Dr. Pride believes that the various microbial components of human ecosystems including bacteria, viruses, archaea, and fungi are important factors that help determine the natural history of their hosts. Furthermore, their interactions with humans or their interactions with other microbial constituents in these communities likely have consequences for human health.

Dr. Pride began by speaking about the microbiome, which refers to the common bacteria and viruses found in the human body. He talked about how humans are an aggregate of microorganisms, which are found all over the body, but particularly in the lungs, gut, eyes, and blood. Almost every surface of the human body has microbes, but much of it is referred to as "human dark matter," meaning we don't know what many of these bacteria are nor what they do. Dr. Pride also mentioned that bacteria can survive in all types of challenging climates, therefore a human host is no problem at all. Microbes are well adapted to living on the human body. Dr. Pride also mentioned an important study that has been done involving lab rats regarding obesity. If you place cells from an obese rat into the body of a lean rat that has been kept in a sterile environment, the lean rat will become obese. This has many interesting implications for humans. Dr. Pride also discussed the bacteria and viruses that are shared between mother and child, as well as the viruses that are shared between college roommates. Dr. Pride also emphasized the importance of decreasing the amount of antibiotics that are taken throughout a person's life, as the antibiotics also kill the good bacteria in a person's system, and the person may never recover those bacteria fully. A fascinating lecture to conclude our series!

RESIDENTIAL LIFE

We are practically done with COSMOS! 4 weeks flew by! This week was filled with events. In addition to our regular week of programs that included a ramen bar, friendship bracelets, and ice cream making, we also had a dance, carnival, and a talent show. Everyone got dressed up for the dance and danced their troubles away. The talent show consisted of 13 incredible acts that ranged from singing to a martial arts performance. Lastly, we had a carnival where the big raffle prize was pie-ing our Faculty Director, Charles Tu. The lucky winner was Jane Wang from Cluster 9! I'm sure there are videos floating around somewhere. We're sad to say goodbye to these amazing and intelligent kids, but we look forward to seeing how they will change the world.



WEEK FOUR

CLUSTER 1: COMPUTERS IN EVERYDAY LIFE

A lot happened at the end of last week. Last Thursday, we presented our Arduinos musical instrument projects. Congratulations to the Faculty Choice Award winners: Skylar and Rebecah, for their "Lumos" light-based musical instrument and the People's Choice Award winners were Bryan and Ian for "Air Music" which was a distance -based musical instrument.

Last Friday we learned about computer architecture including registers, MUXs, memory and ALUs. Then we had our last guest lecture from Joe Politz. He spoke about how his work with Bootstrap helps schools and teachers figure out how to fit computer science into the busy high school day. Bootstrap teaches computer science skills through an algebra, data science and physics lens. In doing so, it presented an interesting engineering challenge. They met the challenge by creating their own computer language. In Bootstrap: Algebra, students create their own video game. Bootstrap is used in thousands of

classrooms throughout the country.

The majority of this week, we focused on our final projects. We got to propose our own final project and get it approved. It had to involve AppInventor, image processing, or Arduinos. After many hours of hard work and some laughs at the weird things our programs would do, we are just about done with many of the milestones in our projects. One project involves an alarm clock which makes you get out of bed to turn it off! Another created their own trash can that will come to you.

Some teams will be using their mobile phones (with an app they created) to control their Ardinos with various sensors and many servos! We have projects that are autonomous driving robots, one that will change the colors of the apparel, security systems, and a robot that will draw based on the commands from an app, just to name a few! Students are using components on several technologies to interact with each other. There are many ways to apply the engineering and science from our final projects to larger robots. Some of us hope to continue to work on our projects after COSMOS and submit it to a science competition this coming school year, such as a science fair or Science Talent Search. These projects have a lot of work and heart in them and having great potential to do well in research project competitions. We look forward to sharing our projects with everyone on closing day. Our faculty was thoroughly impressed with our projects and it was difficult for them to select the Gordon Award winners for our cluster. The videos of our final presentations will be available on our blog.

We would really like to thank all those that helped make our cluster and COSMOS experience one we'll never

forget. From faculty (Professor Curt Schurgers and Professor Leo Porter) to our TAs (Ravi Patel and Jacalyn Li) to our RA (Matt), you helped us learn a lot and have a great time in the process! You can view our pictures on our Cluster's Blog (UCSD COSMOS Cluster 1 2018) http://ucsdcosmoscluster1-2018.blogspot.com/ to see all the fun we had in class and on our field trip!

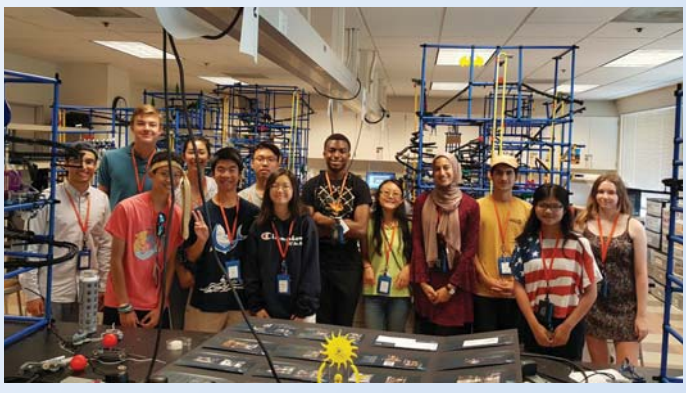
From the author: Thank you to my bright, appreciative and overall wonderful students in Cluster 1. You made my "vacation" fun and energizing! Keep up your curiosity and drive for excellence. I know you will go far in your journeys! Your Teacher Fellow, Shirley Miranda

CLUSTER 2: ENGINEERING DESIGN AND CONTROL OF KINETIC SCULPTURES

Week 4 was kicked off by reflecting on Week 3. Students had finished their mini-sculptures by performing the risk analysis reviewed by Professor De Callafon. On their mini-sculptures students tested their sensors, motors and overall dynamics. They came in Monday ready to incorporate what worked and what didn't work into their culminating sculpture. Delegation of duties became more pronounced as some team members focused on expanding their sculptures, while others worked on programming sensors and NXT motors. By the end of Monday the majority of the groups had a mostly complete design of their sculptures. Professor De Callafon took an hour in the morning to outline what the rest of the week would look like and to clarify expectations.

On Tuesday, after an interesting lesson on how bacterial and viral cells educate our immune systems since birth, students attended the Solar Turbines manufacturing facility in Kearny Mesa. Students where given a tour and a brief explanation on the gas turbines designed and manufactured there. They had the opportunity to speak with young engineers about their experience both as students and as professionals. After lunch, students visited Belmont Park in Mission Bay for some fun and relaxation.

Throughout the rest of the week, students worked hard on improving and troubleshooting their sculptures. Their website has become a priority, since it is their major documentation source. Everything they've produced will be made public there. They have also done a great job at personalizing each page. They have worked countless hours to have a project worthy of COSMOS Cluster 2. The week will culminate with a rehearsal presentation to Cluster 10 and a research expo Saturday morning for the public before the awards ceremony.



CLUSTER 3: LIVING OCEANS AND GLOBAL CLIMATE CHANGE

It's hard to believe that we are just a few days from the end of COSMOS. I am very proud of Cluster 3's progress over the past few weeks. Many of us started the program with a limited knowledge of oceanography and atmospheric chemistry. We have been able to absorb a lot of knowledge from our amazing faculty and TA's. Now, we each are experts in our projects!

"Last Friday, our cluster went to the Natural Sciences Building and used coulometry to titrate seawater solutions in the chem lab. In the afternoon, we went to the Scripps Institute of Oceanography. We visited the deep sea invertebrate collection and saw specimens of different animals that lived on the seafloor, such as yeti crabs and giant tube worms. Afterwards, we spent the rest of the afternoon on the beach, studying sand crabs and swimming in the ocean." -- Grace M

"On Monday we got to go to Scripps pier where we examine the waters near the end of the pier. We took water samples at depth, took plankton samples and we even got to fish in order to see what is living near the end of the pier. It really fun and interesting to see what lives below the surface." -- Ryan C

"On Tuesday, we attended a lecture by David T Pride, he lectured about microbes within the human body and how they are related to one another. After that we went to science communications where we worked on our final projects. Then half of us went to SIO to work more on our projects and composed many graphs with all of our data we had been collecting since week two for our presentations with the help of Dr. Lai." -- Rachel L

"Wednesday, the start of a new month and the end of an old month, we ventured to Scripps Institute of Oceanography for one last time, when we arrived Dr. Lai beckoned us inside with an eye-opening lecture on evolution, and oceanography. Secondly, we partook in a quiz of sorts in which we won prizes such as eye drops, hair ties, and fossils, but the real prize was in our minds all along. We smelled like fish when we went to lunch, after dissecting Frogs, Mackerels, and Crabs to compare and identify the anatomy, but we feasted just the same, and in the evening, we worked with our mentors on perfecting our presentations for our audience, and ourselves. No tea time today, it was just time to work until...the gas leaked, but who leaked the gas? We will never know." -- Ella B

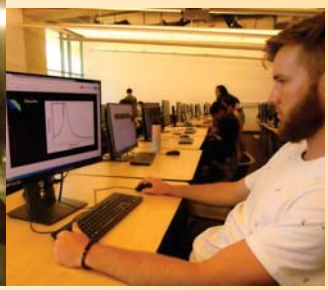
"Today [Thursday] we cleaned up the lab that we had been using for the past few weeks. It was a bittersweet experience, working together as a cluster for what was probably the very last time. Afterwards, we split back up into groups to put the finishing touches on our final projects." -- Leon Z

"We have worked really hard on our projects, presented to cluster 6 and can't wait to share all that we have done with our families and professors." -- Eleanor H

CLUSTER 4: WHEN DISASTER STRIKES: EARTHQUAKE ENGINEERING

The diligent students of Cluster 4 are nearing the end of their summer COSMOS experience, and are concluding a productive week in anticipation of showcasing all of their hard work and efforts. But first, there was much work to be done in the form of last minute structure testing, graphs to analyze, digital posters to finish, presentation slides to complete, and abstracts to proofread.

Another captivating Discovery Lecture earlier this week got us off to a great start, as students learned about the human microbiome. Students also engaged in an interesting question and answer period about college life with Jacqui and Alan. We had a pseudo-final exam in the form of Jeopardy, then it was back to the difficult task of analyzing data and formatting graphs. This lengthy process involves huddling with the instructors and teaching assistants, group brainstorming, followed by further huddling and more brainstorming. Actually it is the raw scientific process of personal growth! Not always pretty, but the final result for our Cosmo-politans is the precious self-knowledge of discovery. They 'did' science, and now possess the confidence to lead their future high school science lab groups to superstardom!



Following the testing and analysis phase, our students went to work on outlining exactly how to communicate their results to the public, or in our case, our friends in Cluster 5. They created an electronic poster formatted on PowerPoint, and are extremely excited to show it off and explain it to you on Saturday. They followed professional research presentation guidelines, and included abstracts, objectives, procedures, conclusions, and their data both tabled and graphic. Then it was time to produce several slides for the bulk of their presentation. This process took approximately eight hours of class time in the computer lab, and their results were wonderful. In four short weeks, our students proceeded from project idea, to objective and testing, and analysis and conclusion. Finally, they presented their findings, and were encouraged to continue their research in the context of a science fair competition. All this while experiencing college life in the dorms, in the dining halls, in the lecture halls and labs, and across this beautiful campus with kindred spirits from all over the state. COSMOS is a one-of-a-kind opportunity for personal growth, for a unique exposure to the STEM fields, for a chance to interact with undergrads and graduate assistants, and bond with their instructors in a welcoming environment. Your kids are so fortunate, and we thank you for allowing and encouraging them to experience COSMOS!

We look forward to showcasing the posters and models to parents and families on Saturday, and the exciting awards ceremony.

CLUSTER 5: FROM LASERS TO LCDS: LIGHT AT WORK

After an eventful, exciting, and fruitful month at COSMOS 2018, students are working hard right this moment to finish up their group projects and prepare for the Research Expo on Saturday. It has been a great learning experience, both academically, and in terms of overall personal growth, and the connections and friendships formed here at UCSD will undoubtedly last well beyond the conclusion of the program.

Last Friday, students joined Dr. Tu for a lecture about further applications of solar cell technology and research applications, followed by the opportunity to continue working on their group project in the afternoon lab session. After an eventful weekend including a trip to Balboa Park, the COSMOS Carnival, and the evening Dance, everyone was ready to get back to work for the final week of the program.

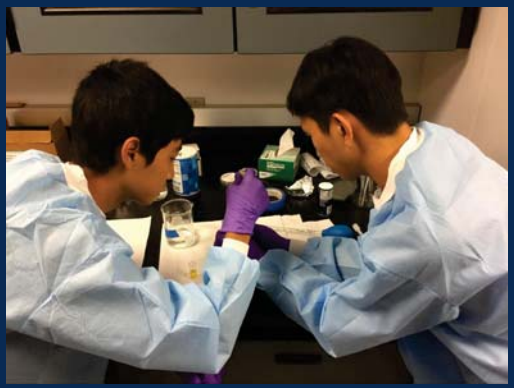
Monday began with a very interesting lecture from Dr. Tu on optical coupling, micro-ring resonators, and photonic crystals, followed by a tour of Professor Mookherjea's Mirco/Nano Photonics Lab. Students then continued to make progress on their projects in the afternoon, with the goal of completing data collection by Tuesday or Wednesday so they can also have time to complete their presentation and research poster.

On Tuesday, the morning began with our final Discovery Lecture from Dr. David Price on the extremely interesting topic of the Human Virome and how important and intricate the microscopic organisms living in and on our bodies are to our health and survival. Next, students spent the rest of the day pushing forward with their projects and nearing the end of their work. Students continued the last stages of data collection, analysis, and organization of ideas for their presentations. It will be a treat to see all of their hard work at the Research Expo on Saturday!

On Wednesday, students were treated to their final lecture from Dr. Tu, where he summarized the content from Cluster 5 and answered dozens of questions on the material that students submitted the day before. It was a great close to the college-style lecture experience that students will become more and more familiar with as they continue their academic careers. Next, students had a wonderful tour of Professor Lo's lab specializing in optoelectric devices and photonic integrated circuits. Wednesday afternoon consisted of the students' final opportunity to work on their group project and finalize data analysis and their presentation and poster.

On Thursday, students were able to practice their presentations for various audiences and get feedback on how to improve their slides, clarity of ideas, and overall effectiveness of communicating science to an audience.

On Friday, Cluster 5 and Cluster 4 will join up for a more formal research presentation rehearsal in the morning, where each group will have the chance to present their final work to an audience of peers. In the afternoon, we will all have a chance to attend a mini-field trip at the Qualcomm Institute on campus at UCSD as a close to our COSMOS activities. After that, we will be looking forward to the Research Expo and Awards Ceremony on Saturday before finishing up the amazing COSMOS experience and heading back home!



CLUSTER 6: BIODIESEL FROM RENEWABLE SOURCES

During week 4, the focus of Cluster 6 is to work on completing our projects and to create our presentations and posters.

On Friday, July 27th, class consisted of the always interesting lab rotations in the morning, and the final lecture, on lab instruments, in the afternoon. This evening, students will attend a Social Justice activity hosted by the RA's. – Rosa G.

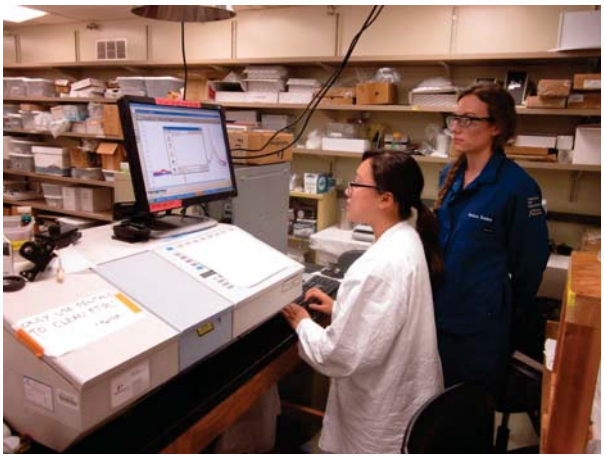
On Monday, July 30th, the students of cluster 6 started their day by heading over to York Hall to finish their Certificate of Analysis for the Biodiesel. In between breaks the student would gather around in their project groups and work on their presentations. After lunch we continued to work on the Certificate of Analysis and then ended the day working with their project groups again- Samantha L.

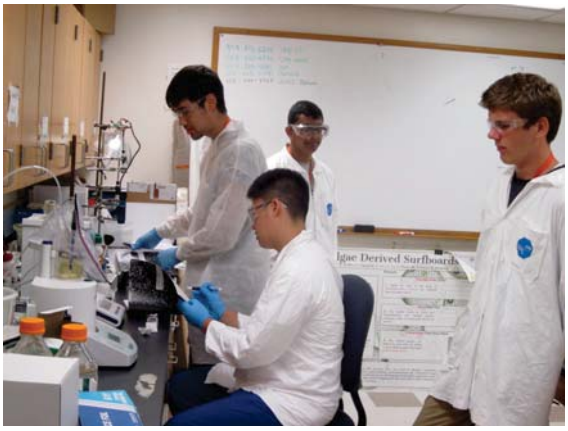
On Tuesday the 31st, Cluster 6 students attended the last discovery lecture of the program. Dr. Pride, a professor of molecular microbiology, explained the development of the human virome and the different types of microbes that exist within the body. Later in the afternoon, students were given additional time to work with their project groups in order to finish any data collection. -Sophie J.

On Wednesday, August 1st, the students spent the entire day working on their projects and preparing for the final presentation on Friday and Saturday. They have completed their final lab procedures and collected all the data they need. In the afternoon they signed Thank-You cards to all the professors, teacher-fellows, and graduates who assisted them along this journey. -Jack L.

On Thursday August 2nd, we spent the day working on Posters and Presentations. All groups have finished their data collection, have processed their data, and are pulling everything together to present on Friday. All the groups have been working well together and have accomplished their goals. I'm looking forward to seeing all of the presentations on Friday. – Mr. Towler

Friday August 3rd is our day to finish practice for our presentations and then to present our projects to Cluster 3. Cluster 6 had 5 project groups who presented in preparation for our presentations to parents on Saturday.





CLUSTER 7: SYNTHETIC BIOLOGY

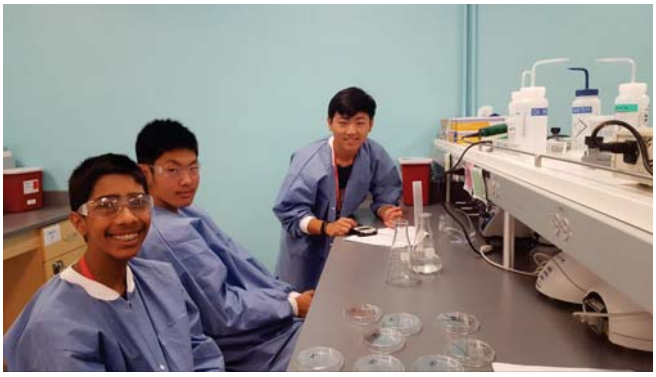
Students in Cluster 7 had a very busy last week of COSMOS! They worked on their experiments with bacteria that smell like bananas, did protein purification, did protein electrophoresis, and finished their projects, presentations and posters. Somehow, they still had time to see the Salk Institute and the Fallen Star at the top of the Engineering Building. It's been great seeing the innovative and creative final projects these students have designed. They are incredible. We're all sad to see the program end, but hope the lessons we have learned will last us a lifetime!

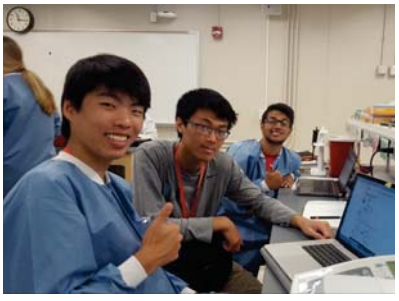
Here's what the students had to say:

7/30/18

On Monday we spent the whole day working and learning in the lab! First, Dr Vera taught us about RNA interference, or RNAi and we watched a video about it. This is a phenomenon where RNA will get destroyed in the cell if it looks like it might be a virus. We learned about how it worked and what possible applications it could have, like in medicine for example. After that we got to work on our final project for awhile. There are a lot of interesting projects going in in cluster 7, from colored E coli to glowing yogurt! After lunch we learned about a lab called What a Colorful World, that another group did as part of their final project. Then we did a lab called GFP purification where we were able to isolate green fluorescent protein from a sample from a previous lab we did. We returned to working on our final project for the rest of the day afterward.
~Hallie and Nathan

8/1/18
Today was a day of science communication. All of the groups presented their work on their final projects through really amazing slides and investigational queries. In doing so, we learned so much about the possibilities of synthetic biology, but more importantly, we learned more about how much we were able to accomplish in under two weeks. As we near the end of COSMOS, it's amazing to see our growth in the synthetic biology field as students creating our own ideas and innovative projects. We look forward to when we all present on the last two days where we truly get to show all that we have learned and are able to perform. This has been a great experience, and we have learned more than we ever thought we would.
~Zach, Rupin, and Ravi





CLUSTER 8: TISSUE ENGINEERING AND REGENERATIVE MEDICINE

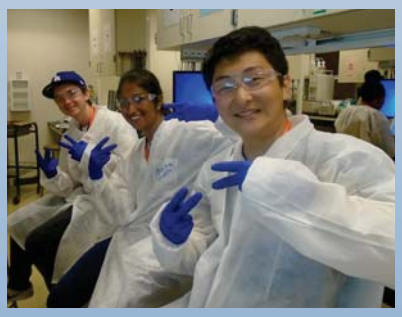
It is hard to believe, but it is our last week! Week 4 began and ended with an enormous amount of work. It was remarkable to us just how much planning and preparing was necessary to complete our projects and how much thought was required to problem solve and analyze our data. As the week progressed our projects were completed, posters were finalized, power points finished, and our research paper ultimately completed. Each group worked with a professor and cluster assistant in order to complete their projects. In the end we proficiently presented our projects to our cluster, cluster 7, and on Saturday we will give professional poster presentations to our families and friends.

In our last Discovery Lecture, Dr. David Pride, whose laboratory focuses on the role of microbial communities in human health. As COSMOS 2018 comes to a close, it is inspiring to see what everyone has accomplished. We have become proficient in our lab skills, refined our technical writing, and developed and implemented our leading edge projects. We all want to extend a gigantic thank you to our GR8 Professors, Dr.Sah and Dr. Gaetani, our GR8 Cluster Assistant's, Erica, Julian, Kurt, and Nathan.

What I will always remember about COSMOS 2018 is…

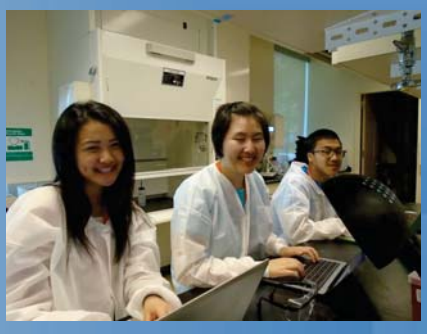
…that 2X spicy noodles are absolutely unbearable- **Aaron.**
…that Dr. Gaetani has the best Italian accent of all time-**AJ.**
…all of the amazing and talented people I met and all the new things they taught me-**Anika.**
…the part of the program played in helping me determine my future-**Brandon.**
…the lab and 70% ethanol-**Caroline.**
...the friends I made, the opportunities provided to explore aspects of science that I would otherwise not be able to, and especially my suite-**Connie T.**
…the food at canyon vista and the hills we walked up-**Connie S.**
…the programing events the RAs prepare for us and the great friends I met because of it-**Dina.**
…new friends, Just Dance 2012, and House Party by Sam Hunt-**Eden.**
…the great research experience, the supportive educators, and my amazing suitemates-**Ethan.**
…the hustle and bustle in the lab room and hanging around the green with friends-**Jeanne.**
…the people I met and Canyon Vista-**Joyita.**
…the wonderful people that I met, and I realized how close people can become within such a short period of time-**Leela**.
…working in the lab and having fun with my new friends-**Mark**.
…all of the great friends that I made, all of the jokes that were made, and the hard work that we did in the lab-**Raman.**
…are all the amazing people I met-**Sean**
…when I was working in the lab with my friends-**Shawn.**

Cluster 8 has had a Gr8 summer at COSMOS!







CLUSTER 9: MUSIC AND TECHNOLOGY

UCSD COSMOS is in the home stretch and students in cluster 9 have been immersed in their capstone projects for the past ten days. Professors Oliveira and Dubnov along with grad students Colin and Kevin have been providing technical expertise with a 5-to-1 student to instructor ratio. Much of the learning, however, has been autodidactic with students scouring the internet for resources and information to aid them in their work. Below are the student project descriptions in their own words.

We sought to invent a modified and mechanized clarinet. We programmed the potentiometer to enable users to adjust the instrument's pitch to play any musical octave. In all, Project Box is a versatile and portable wind-instrument that can be conveniently tuned to play any musical note. (Jonah, Tasmin, Cartee

Rhythmech is a drumstick that can play the basic sounds of a drum set by waving the mechanism around. The accelerometer controls the volume of the sound and pressing different combinations of buttons will yield different sounds. (Allison, Vivianne, Shreya)

The purpose of this project is to accurately reflect the mood evoked by an image or painting. It utilizes python programming algorithm and color-emotion associations paired with music theory concepts to achieve this. (Do, Grady, AJ)

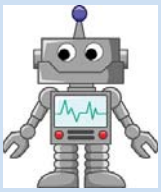
This project is inspired by the idea of having a ukulele that runs entirely on lasers and sensors. This system will allow for a combination of notes played by different simultaneous fingerings to form chords, like an actual ukulele. (Stephen, Nathan, Kevin)

We are creating an audio-visual product so that the music experience can be felt through more than one sense. With a running pattern through the LED, the music seems to flow through your body like through the strip. (Hannah, Harim, Sarina)

AiM is a tech project based with the objective to create a hands-on music experience designed for cardio workouts. In order to encourage the exercise of the whole body in a workout, the system plays different portions of a song. AiM will become a source of motivation, bringing a hands-on experience to any workout. (Sam, Isaiah, Bernice)

HarmoME is a vocoder that modifies the pitch of voice input in real time, creating effects that can transform a voice or harmonize with it. HarmoMe transposes pitches and applies effects, such as tremolo and ring modulation. (Jane, Allison, Erin)

CLUSTER 10: ROBOT INVENTORS



It is our final week in COSMOS! We are wrapping up with student projects designed by each of our teams. These are the students' own concepts from start to finish, and we can't wait to show you all their robots on Saturday morning!

Week 3 recap: Week 3 ended with our walking robot competition! We had rollers, crawlers, dancers, and even an attempt at a tall, passive-walker style robot. In the end, it was a quick crawler that took home the victory, even besting our TAs!

Day 1: This week kicked off with full robot design and creation. Students were busy CADing their designs, cutting parts with the laser cutters, 3D printing, and determining if their ideas would work in the prototyping phase.

Day 2: Today began with our final Discovery Lecture, this time by Dr. David Pride, who introduced us to the wonders of the human microbiome. Students then began their final posters for COSMOS - an overview of their final projects (ask them to show you!). They also added their previous projects to their growing digital portfolios (have them show you these as well!). The afternoon continued with trying to get a working first phase of their final robots.

Day 3: Today was the final full day in lab, so robot assembly was key - teams were able to assemble their ideas today and many have something much closer to a working robot at this point. Troubleshooting and assembling were the primary focus for today.

Day 4: Our final day in science communication began with students finishing up their posters and their digital portfolios. Hopefully these will be an excellent record of their time here at COSMOS and will help students with internships, college applications, and beyond.

We had an absolutely fantastic time getting to know your students this summer, and we can't wait to see what they accomplish from here!

"I really cherish being able to work and learn with my friends on such an interesting project" - Maggie

"It is awesome how I have evolved from building robots using kits to building robots with parts I have designed by myself" - Neelay

"Being able to use 3D printers and laser cutters whenever I want has been such a great experience for me. They give so much freedom when thinking about robot designs, not to mention tons of satisfaction!" - Nathan

"Messing around with the robots and finally being able to make it work after millions of different failures is fun!!!!" - Sushovan

"Overall, I really enjoyed working in Cluster 10 due to the hands-on experience and new knowledge we gained" - Raymond

"Coming to COSMOS not only helped me explore my passions and interests, but it also enabled me to meet a variety of people who may be my colleagues and competitors in the future." - Kevin

"It's been a really cool learning experience to 3D print complex objects, and to be able to incorporate them into our projects!" - Skyler

CONGRATULATIONS!!!

…. Dr. Joseph Watson Awardees

…. and Gordon Engineering Leadership Center High School Fellows.

Cluster 1

Cluster 2

Cluster 3

Cluster 4

Cluster 5

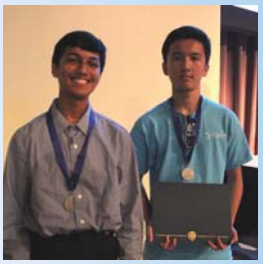
Cluster 6

Cluster 7

Cluster 8

Cluster 9

…. And to Ethics Essay Awardees



Cluster 10

COSMOS 2018

CLUSTER 1

CLUSTER 2

CLUSTER 3

CLUSTER 4

CLUSTER 5

CLUSTER 6

CLOSING CEREMONY

CLUSTER 7

CLUSTER 8

CLUSTER 9

CLUSTER 10

Teacher Fellows