



FAMILY NEWSLETTER

The Newsletter for Families of COSMOS Participants – Monday, July 13, 2009

Dear COSMOS Families and Friends,

It was a pleasure meeting many of you on Opening Day. It has been delightful getting to know your students, and we are pleased to offer you this newsletter which is designed to give you a glimpse of what the students have been busy doing during the first week of COSMOS and provide updates about the residential component. Of course, it may also serve as a supplement to communications you have with your student (for those who remember to call home).

As part of our Distinguished Lecture Series, the students attended the ever popular Chemistry Magic Show which involved several explosions, a little bit of fire, and many other chemistry magic tricks! We encourage you all, if you are in the area, to come to our next Distinguished Lecture on Wednesday July 15th from 1-1:50pm in 123 Sciences Lecture Hall presented by Dr. Bernardo A. Huberman, Senior Fellow and Director of the Social Computing Lab at Hewlet Packard Labs. His lecture titled *Social Attention in the Age of the Web* will enlighten us about the dramatic changes in the ways people interact and create and exchange information in the past decade.

Residential Update

We have made it through our first (very busy) week of COSMOS! The residential staff was eagerly awaiting the arrival of your students and now that they are here, the program is in full swing. We are so glad to have the residence halls full of your delightful, enthusiastic students!

The students have been enjoying a variety of activities this week. There have been several students taking advantage of the pool here in the residence halls in the evening and many of them have been participating in the social events we have had planned. This week the activities ranged from games of sardines and twister to tie dye, baking, a Davis bike tour, volley ball, crafts, and much much more! We also had two nights of bike registration and on Thursday we had a fire drill. Both of these events went smooth. On Saturday (July 11th) we hopped on our busses and headed out to Roseville, CA to visit Golfand Sunsplash. Despite some very light rain, the students enjoyed the waterpark and a BBQ lunch.

A few reminders:

- Please encourage your students to bike safely (and slowly) there are many other groups on campus and we want everyone to be safe and sound!
- Remind your students to leave expensive personal belongings safely secured in their room. Passports and other important documents may be stored in our safe. Students who want to put something in the safe should contact their Resident Assistant.
- We had a VERY high volume of short-term leaves over the weekend. Here a few very important reminders.
 1. You may not take your student from the residence hall if you do not have a short-term leave form (STLF) on file and a senior residential staff did not release the student to you, please no exceptions!
 2. STLF must be received no less than 24 hours in advance. They should be faxed to 530-752-1817 or emailed to sbdriver@ucdavis.edu.



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3. Before you take your student you must check-in with Sarah Driver, Resident Dean or Jordan Huller and Sarah Mo, the two Senior Resident Assistants, so they your student is officially released to you.
4. Under NO circumstance are parents or other family members allowed inside the residence hall at any time. Please respect this rule, it is there for a reason, and please do not give our staff a hard time.
5. When you designate a pick-up and drop-off time on the form, please adhere to it. Being 30 minutes or two hours late prevents our staff from doing the rest of their job.
6. I also want to remind you that students *and parents/guardians* signed the Participant Agreement which clearly states leaves must be prearranged, may not occur until 5:30 p.m. on Fridays and visitors are restricted to parents/guardians. Students and/or family member's failure to abide by the rules cited in the Participant Agreement may result in a student's termination from the program and/or ineligibility for COSMOS alumni opportunities.

Please understand we have 190 students to keep track of and we hold ourselves to a high standard of safety and security, and therefore, need and appreciate your help to execute Short-term Leaves in a manageable way.

We are glad that your students are here and hope it continues to go well, and we look forward to working with you to improve upon Short-term Leaves! We hope your student is having as much fun getting to know us as we are getting to know them! If you have any questions or concerns or if there is anything we can do to make this a more enjoyable experience for your student, please do not hesitate to contact Sarah Driver or Emily Murdock!

Below, you will find a report for each Cluster. This information is compiled from weekly reports submitted by the Teacher Fellows.

Cluster 1

Cluster 1 has been busy this week learning the basics of biotechnology and getting our feet wet in the lab. We are currently juggling three experiments. We have begun a plant transformation experiment, one involving *Agrobacterium rizogenes* and we have learned how both bacteria and viruses can be used in the transformation of plants. Additionally, we have attempted to isolate our own DNA, amplify it using PCR and run it out on a gel to determine the number of short tandem repeats at a specific location in the genome that we each have. Unfortunately, we did not see any PCR products on our gels- this is not a bad thing, just a great example for students to learn how science really works! On Friday, we brainstormed the potential issues with the protocol and we are going to troubleshoot these on Monday, all while starting another crop of experiments. Eventually, (when we are successful with the PCR), we are going to purify this DNA and have it sequenced, so that we can quantify the number of repeats in each of our genomes.

On Tuesday, we took a tour of the facility where they house transgenic goats on campus that were created using a technique called nuclear injection. These specific goats have been given a gene that increases the production of a protein called lysozyme, which has antibacterial properties and is believed



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to help both the goats fight off a common infection of the udders (mastitis) and improve the intestinal health of the kids and baby pigs (used as a human model). Dr. Allison Van Eenennaam, a researcher of transgenic organisms was kind enough to explain the science behind the goats and then took us to meet Elizabeth Maga (animal biology researcher) who let us meet these very friendly creatures.

We are looking forward to our outing on Tuesday to Affymetrix in Santa Clara.

Cluster 2

A whole lot of physics has been happening in Cluster 2 this week. Niels (Dr. Jensen) has led a survey of the scientific history of our understanding of the universe, starting from Ptolemy and the Greeks with their Earth-centered ideas, up to Newton, who once and for all buried the Earth-centered concept and replaced it with the gravitationally organized sun-centered solar system. Meanwhile Diego (Dr. Yankelevich) has led the cluster to understand the behavior of light at interfaces between media of differing index of refraction. In the laboratory, the students soldered components together, and hooked up lasers to power supplies, then used the lasers with optical components that they prepared and shaped to test the concepts that they had learned. The students first mixed the ingredients for siloxane polymer, and poured castings into petri dishes, then cut the flat polymers casts into prisms, and other shapes to shine laser beams through and measure quantities such as index of refraction, critical angle, and Brewster's angle for plane-polarized laser light.

Our major field trip for the week was to the Exploratorium in San Francisco on Thursday. After lunch with the birds on the grass outside, we explored the cool demonstrations of scientific principles inside. It was such a fun experience and a beautiful day that no one seemed to mind the traffic we had to fight on the way back from the bay area in the late afternoon.

By the end of our academic week on Friday, each student had identified an area of energy production that he or she would focus upon researching for the final projects. Then we ended with a Friday afternoon comedy show...each student presented a joke or two while practicing good oral presentation technique.

Cluster 3

This week we have learned that the logic of Mathematics and the laws of nature used in Sciences are key factors in the development of Products and Process from Engineering and Technology. Professor Hafez has lectured on the importance of Mathematics, in terms of Geometry, Algebra & Calculus as being the tools that Engineers use.

Professor Park, Assistant Professor from the Green Transportation Laboratory Department of Mechanical and Aeronautical Engineering has taught us about cars and alternate vehicles. We have learned about the technology used to make Fuel Cells, Electric motors, and Hybrid engines. Some of the Cluster 3 students got to ride the Segway (as seen in the movie Mall Cop), a single person electric vehicle. Professor Park collected written proposals for better designs or improvements for the Segway from all students. On Friday, Professor Park gave a concluding lecture on PHEV (Plug-in Hybrid Electric Vehicles). Everyone has learned about the problems, benefits, and availability of such vehicles. Professor Park believes it's "the best solution for the near future."



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On Wednesday, we were all colorfully dazzled and entertained by the Chemistry Department with the Chemistry Magic Show. Our very own brave cluster-mate, Vinay, helped with the ignition of the Ethanol Rocket.

On Thursday, we went to visit Moller International, a Flying Car Company, and got to see and learn about the history and development of the Moller Skycar. We got to see many model designs, concept vehicles and learn about how the flying cars are powered. Students had a chance to sit in the vehicles and take some real cool pictures.

All Students have been given their topics for the final project and will begin to research information by Friday after a tour of Shields Library.

Cluster 4

Cluster 4 has been learning about how humanity has contributed to global climate change. Students are required to debate the evidence presented to them by their professors, work in groups and come to conclusions about science in the real world. On a personal level, students have had to tally their own carbon footprint, and see how what they do in their daily lives contributes to the worldwide problem. Student's found that video games, showering, swimming and blow drying hair each have a carbon price tag.

On Tuesday students went first to the large delta model in Sausalito, that shows how California waterways flow through the valley and onwards to the ocean. Before heading back to Davis the students visited the California Academy of Sciences in San Francisco, where they saw sharks, ancient fish and an albino alligator. Later in the week students visited the Yolo Basin and learned about wetland restoration and the migration patterns of birds.

Cluster 5

Unfortunately, no update is available.

Cluster 6

The Mathematics Cluster is designed to give students an idea of the breadth and scope of Mathematics in the world. Last week we started a module on Combinatorics which gives us a new look at the familiar mathematical concept of counting. We also started a module on Topology in which we learned how mathematicians can find deep mathematics in things as every day as knots, and how a coffee cup is really the same thing as a donut. In addition, we worked on skills in problem solving and mathematical writing.

In the problem solving sessions we are working on becoming conscious of the methods we use to solve mathematical problems so that we are able to refine our strategies and succeed when our intuition doesn't help. In each activity we do, we are learning a very important tool in any Mathematician's arsenal: asking thoughtful mathematical questions.



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On Thursday, we visited the Keck CAVES, where students were able to see a 3D projection of the earth from the inside and outside. We saw how the Keck CAVES advances understanding of the Earth by providing an environment for interdisciplinary collaboration founded in visualization of complex scientific data. We learned about the development and use of tools for sophisticated scientific research.

Cluster 7

Cluster 7 has had a very busy first week of COSMOS 2009. The week began with extensive bacteria-related discussions and laboratory work. Students participated in lectures and discussions about pathogens, gram-positive bacteria, gram-negative bacteria, tetanus, syphilis, botulism, and anthrax. While learning about bacteria in the lecture hall, students experienced bacteria in the laboratory as they learned to culture, incubate, gram stain, and identify different types of bacteria. After culturing and isolating bacterial colonies, students tested for antibiotic resistance. Enterotubes were also utilized to help identify strains of bacteria.

Cluster 7 also got a good introduction to veterinary medicine during the first week. On Monday, students were given an introduction to the veterinary school anatomy lab and specimen room. Students will be getting a more in depth look at animal anatomy in the upcoming week. On Wednesday, our five UCD Veterinary student teaching assistants held a panel discussion to share their experiences getting into veterinary school and being veterinary students. The veterinary students will also be doing an extensive radiology lecture and lab with the students.

On Thursday morning, Cluster 7 visited the Sacramento Zoo, where they took part in an information scavenger hunt. In the Writing/Communications course, students were introduced to scientific writing, research, and their cluster projects. Each student will be writing a research paper on a subcategory of a larger health-related topic, which their group of four students will creatively present to the entire cluster during the last week of COSMOS. In addition, students will each be writing a science fair proposal, with the option of submitting the proposal to compete for two \$500 Intel science fair grants awarded to Cluster 7 students. Students also began the "Human Body Project" during the first week of COSMOS. The first week of COSMOS has certainly been very busy, educational, and fun!

Cluster 8

Last week students were introduced to all of the interesting topics to be covered over the next four weeks by their faculty members, Toby Allen, Annaliese Franz and Dean Tantillo. On Tuesday, students visited the Davis Waste Recycling Center and had an exceptionally cool experience at UC Davis Keck CAVES, a virtual project that allows an up close and personal view of things such as carbon nano tubes, folded proteins and other very small molecules. Students spent a lot of time in the computer labs learning the ins and outs of molecular modeling software. Professors Tantillo and Allen gave introductory lectures on the basics of organic chemistry and the importance of bond energy in the structure and function of amino acids and proteins. Cluster 8 students also began the process that will eventually lead to a final project by doing topic research and working in the library. All is well and moving in Cluster 8.

Cluster 9



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Cluster 9 had a fantastic first week, with an “insane amount of work and activity” (according to Tian.) On Monday morning, Dr. Chris Taylor started us off with an introduction to astrophysics, and Dr. Vera Margoniner and Dr. Chris Fassnacht continued with an introduction to our projects. Then we selected our projects on topics ranging from radial motion of globular clusters and stellar spectra of cold stars to measuring orbits, computing masses and producing HR diagrams. All that before lunch! After lunch, Jim Johnson told us about our project format and gave us some pointers on how to conduct background research. We learned about a “SmartSite” for our cluster containing resources to help us with our projects, and then even had some time to start researching using laptops that the instructors provided.

Tuesday we had our first field trip, leaving right after breakfast for the Discovery Museum in Sacramento where we were treated to a very cool presentation in the museum’s planetarium. Back in Davis, our faculty introduced us to astronomical data collection using CCDs and spectrographs, and then they explained how to get a final spectrum out of data (called data reduction). Karen Andrews, the head physical sciences librarian at UCD, came by and taught us some efficient ways to find and organize scholarly information using various resources at UCD.

Wednesday we learned about light (wave-particle duality, speed of light, energy of light, etc.) and gravity (Kepler’s laws, Newton’s laws, etc.). In the afternoon, we did several activities whereby we learned about how optical telescopes work, how to calculate angular magnification, and how to find objects in the sky using angular measurements, right ascension and declination, azimuth and altitude. We used a snappy “stellarium” software program on our laptops to investigate celestial events of the past, present and future.

Thursday we learned more about light, observatories and gravity, and we did a series of activities to prepare us for our field trip to the observatory that evening. The highlight of the week was our field trip to the Cameron Park Community Observatory up in the Sierra foothills near Placerville. We left after dinner and arrived in time to set up our equipment before dark. We used the observatory’s two 14-inch Celestron Schmidt-Cassegrain telescopes, plus Dr. Paul Feldstein’s personal telescope and another telescope from Sacramento State University. It was a beautiful, clear night, and we were able to observe an enormous variety of objects. We saw planets, nearby stars, “deep space” stars, clusters and nebulae up to about 55 million light years away. We also used a CCD imaging camera to take pictures, and a CCD camera and a spectrograph to take spectra of objects in the sky.

Friday Jim gave us some more pointers on summarizing and paraphrasing, and we worked some more on our annotated bibliographies.

Wow, what a week!! Cluster 9, we’re so fine!!

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As always, if you have questions or concerns, you are welcome to contact us at the COSMOS Office at cosmos@ucdavis.edu or by calling (530) 754-7325.

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