CLUSTER 5: FROM LASERS TO LCDS: LIGHT AT WORK

The first week of COS-MOS is almost over, but the memories are just beginning! We have bonded in class and lab along with preparing for COSMOlympics. We have been busy! After learning about safe usage of lasers and lab equipment, Dr. Tu began our introduction to Light, Optics, and Photonics covering the many applications and concepts of light. He demonstrated bending of light by the use of polarization and dispersion glasses, glow sticks, and lasers.

In the lab that afternoon, we saw the power of lasers, as Dr. Peter Ilinykh demonstrated how the energy in light can be used and directed to burn paper and wood. Dr. Ilinykh, along with Cluster Assistants Joseph Smalley and Joseph Ponsetto (commonly called “The Joes”), then combined different lasers to show the effects of refraction, reflection, and dispersion. Taking measurements and using Snell’s Law, we were able to accurately predict Total Internal Reflection and Critical Angles in different materials, the concepts used in fiber optics and lenses.

Students enjoyed Dean Al Pisano lecture about “Engineering for the Public Good”, impressed with his passion and enthusiasm for engineering and science careers. We all were inspired to continue working towards positively impacting our society and world.

Tuesday and Thursday were devoted to preparation for their final project. They learned the importance of proper communication and the ethical considerations of scientific discovery and applications, ideals that will be implemented in their final projects. Students were introduced to a solar cell project, then made their own solar cell from Titanium Oxide, Berries, graphite, and conductive glass plate. After testing, many cells were able to reach the maximum theoretical volts. This is one of the projects the students may choose to expand into a larger final project.

Wednesday, students were introduced to the theoretical concepts of LEDs and semiconductors, then gathered data and conducted experiments. Later they worked on spectroscopy and the applications of this science, making their own spectrometers and discussing how this project could be expanded into another of the four final projects.

Throughout this amazing learning everyone is doing, we have all bonded as a great group and family. What an amazing week and we all look forward to the great things that are to come, in Cluster 5!
This week has started with a bang. Sadly, after a fantastic skit and the “BEST CHANT” from any cluster, Cluster 5 was saddened they did not win the COSMOS-Olympics.

This did not lower the spirits. After a great study on biometrics, light controlled bugs, and fingerprinting, the students enjoyed a quick trip to the beach and went back to work on some great things.

The invention and study of lenses has allowed our society to progress to some great heights, and the group has really been studying the effects and concepts of how these work. From learning how both camera and glass lenses are made to contact lenses, the students were able to get into the lab and apply these same methods to lasers and lenses. By manipulating certain variables, they were able to create great images and resolve many image issues with great resolution.

Tuesday we also were able to meet and greet NASA Astronaut Chris Cassidy. He was part of a different project on campus, but our Cluster was able to jump over and see some of the studies and work being done with optics and NASA. We had the opportunity to see some great images from space, touch a moon rock, and listen to Astronaut Chris Cassidy’s experience on the International Space Station.

The students also were able to visit this week Dr. Tu’s, Professor Zhao-wei Liu’s Lab, and the UCSD Photoluminescence Lab. The applications of the knowledge we have been studying is getting much more in depth and exciting for us all. The work that is being applied in these labs amazed us and helped to cement those concepts we have been working with in our lab. This was the last week we worked on all the projects and students will have to choose next week what they want to study more in depth for their project.

As this was the last week of introductions, students were able to work on both PDMS Lens and Holographic images. These projects may be chosen for future studies. The applications of the PDMS lens was great as these are most likely the lenses that will be used in smart phones and small cameras in the future!
ALLAN BROWN IS CREDITED FOR SAYING “EDUCATION IS THE MOVEMENT FROM DARKNESS TO LIGHT.” THIS IS A GREAT QUOTE TO DESCRIBE WHAT IS HAPPENING IN WEEK 3 FOR CLUSTER 5. THESE WERE SOME OF THE BEST ESSAYS WRITTEN AND WE CAN ONLY HOPE THE FINAL JUDGES RECOGNIZE THEIR EXTREMELY HARD WORK. TOPICS RANGED FROM BLUE LIGHT BEING USED TO STIMULATE NERVE CELLS AND BIOMETRICS TO SOLAR CELLS AND GOOGLE GLASS. STUDENTS PUT IN A LOT OF TIME DOING RESEARCH ON THEIR TOPIC AND FINALIZING THEIR ESSAYS. DURING THE WEEK WE WERE ABLE TO VISIT SOME ADDITIONAL LABS ON CAMPUS. WE SAW SOME GREAT APPLICATIONS OF MICROFLUIDICS AND BOTH OF OUR CLUSTER ASSISTANT’S LABS AND THE WORK THEY ARE DOING. AS THEY HAVE BEEN HELPING US SO MUCH, IT WAS EXCITING TO SEE WHAT THEY ARE STUDYING AND WORKING ON!

EVERYONE HAS ALSO FINALIZED THEIR FINAL PROJECT CHOICES. LECTURES AND LAB TIME HAVE GOTTEN MORE SPECIFIC FOR THE STUDENTS AS THEY WORK ON THEIR PROJECTS. ONCE THEY HAVE CONCLUDED THEIR BACKGROUND RESEARCH, THEY WILL BE CREATING AN EXPERIMENT, COLLECTING DATA, AND THEN PRESENTING THEIR FINDINGS ON THE FINAL DAY. PROJECTS RANGE FROM BUILDING SOLAR CELLS, PDMS LENS, HOLOGRAPHIC IMAGES, AND USING LASERS TO BUILD A BOARDLESS KEYBOARD.

AS A GROUP, THE CLUSTER HAS BECOME A VERY CLOSE FAMILY. WE ALL ENJOY EATING WITH EACH OTHER AND DURING THE EVENING PROGRAMS TYPICALLY STAY CLOSE TO EACH OTHER. IT IS AMAZING HOW FAST THESE PAST THREE WEEKS HAVE GONE, SO WE MADE SURE TO HAVE SOME FUN THIS WEEK AS WELL.

DURING THURSDAY’S COMMUNICATION CLASS, WE FINALLY WENT UP TO SEE THE ART PIECE “WANDERING STAR,” OR IS COMMONLY CALLED DOROTHY’S HOUSE. IT’S BUILT ON THE ROOF OF THE ENGINEERING BUILDINGS AND DESIGNED IN A WAY TO OPTICALLY STIMULATE AND TO CREATE ILLUSIONS. IT WAS A GREAT, FUN TRIP FOR US ALL AND A WELL-DESERVED BREAK FROM OUR RESEARCH.

KEEP ON SHINING EVERYONE AND WE ARE GOING TO HEAD ON BACK TO WORK ON OUR PROJECTS!
Our final week has come to an end, but it was filled with excitement and learning. The week started with a field trip to Cymer. Cymer is the world’s leading producer of tiny lasers that are used to create computer chips. We were able to see their research and manufacturing facilities and their numerous clean rooms while learning the practical applications of many of the concepts we had been learning in class.

We also heard from some different guest speakers talking about their research and projects. From Microfluidics, Camera Lenses, to optical implants and nano-lasers, we were able to see numerous applications of lasers in our daily lives and future technologies. These were great at showing the practical applications and theoretical applications of how light is the way of the future.

This week was also a busy week as students completed their projects and presentations. Classes were spent gathering data and putting the finishing touches on the many projects. Our projects range from organic dye solar cells, PDMS lenses, Holographic Images, to a laser keyboard. These projects were amazing and as Cluster Advisors, we are very proud of the work that they did.

This group was one of the tightest groups/cluster on campus and we had a lot of fun and even learned a tremendous amount during the way. Cluster 5, thank you for allowing us on your journey of knowledge towards the light. Cluster 5, what an awesome time together.