**Multi Department Activities**

Science Express-The Chemistry, Biological Sciences, Earth and Atmospheric and Planetary Sciences, and Physics Departments of the Purdue College of Science deliver research-grade instruments to high schools in 17 Indiana counties. Numbers for the month of October are as follows:

Department       School Visits       Student/Instrument Interactions

Chemistry           33                           2751

Biology                 14                           1416

Physics                 4                              158

EAPS                      24                           2104

Advanced Placement Fridays- Earth, Atmospheric, and Planetary Science Outreach, in conjunction with Chemistry Outreach, is excited to offer AP Lab sessions during the Fall 2017 semester at Purdue University.

**Biology Outreach**

GPI -US– Boston. Japanese High School students to visit Purdue March 26 – 27, 2018:   Biology Outreach together with Physics Outreach met with the representative of GPI-US-Boston to plan a visit of 44 Japanese high school students to Purdue University next spring 2018.GPI-US-Boston is the US affiliate of the Japanese Cultural and educational exchange Organization. Their interest in visiting Purdue are twofold. Most of the students on this visit are students from the High school attended By Nobel Laureate Prof. Ei ichi Negishi, Department of Chemistry. They will be hearing from him. In addition, the students will engage in hands-on activities both in Biology and Physics and learn how science is taught in US high schools.

Biology Outreach conducted the Fall 2017 Weekend Workshop for Teachers this October, Saturday 28th. High school biology teachers teaching both regular biology and advanced Placement (AP) courses attended. The workshop is co-sponsored by the Indiana Association of Biology teachers. The topic for this workshop was “ Protein structure and Function. Teachers received 10 PGP (Professional Growth Points) credits for attendance.

Biology Outreach met with Graduate student from Biological Sciences graduate Education program and Outreach Graduate student in from the University of Nebraska. An introduction to Purdue’s Biological Sciences Outreach program was presented and discussions about science Outreach as a viable career option for graduate students were presented.

As part of Biology Outreach’s minority recruitment initiative, Biology Outreach visited with the NOBOCHE ( National  Organisation of Black Chemists and engineers) program at North Central high school, Indianapolis, and shared with students opportunities for pursuing  biology studies at Purdue.

Monthly Outreach Meetings: 1) Meet with the Director of Science Outreach: 2) Science Express; and 3) Science Outreach Coordinators meeting.

**Physics Outreach**

We held the October Saturday Morning Astrophysics on campus with 30 students attending. We currently have 40 students in grades 9-12 registered for this program. In this month’s lesson, Scaling the Cosmos, student teams created models of the solar system with both planet sizes and distances on the same scale. Graduate student Riddhi Mehta and post-doc Avery Archer co-led the session with 11 grad and undergrad students as mentors. I initiated conversations with faculty members Chen-Lung Hung and Rafael Lang for developing additional SMAP sessions.

Outreach coordinator David Sederberg worked directly with six Physics and Astronomy faculty this month in preparing broader impact components for NSF proposal submission; Csathy, Durbin, Mugler, Rodriguez, Iyer-Biswas, and Hung. Proposals were submitted that included teacher professional development, on campus programs for middle and high school students, and additions to Sidewalk Science, as well as additional resources for Science Express.

Among the efforts of continuing service learning students, Trey Roob is collaborating with Gabor Csathy and David Sederberg, and with faculty at Cornell University, in the preparation of a manuscript on the Too Cool to Resist project. In addition, Sederberg continues work with working with Guna Kondapaneni and Phillip Sands on the Searching for Exoplanets computer simulation, also intended for publication. The goal is to submit both articles by the end of the semester. Service Learning student David Beardmore is developing several new exhibit stations for Sidewalk Science.

I also continue to assist Debbie Beck with the design of a laboratory apparatus in which high school students will use rotational motion as foundation for learning about the existence of dark matter. Debbie’s work will be an activity for an upcoming SMAP, as well as provide a lab that will be disseminated to physics teachers through Science Express.

Work continues on the promotion of the study abroad program in Nanjing China. I participated in a College of Education Study Abroad Fair in September, sharing details of the program and recruiting potential students.

I’ve continued to make significant improvements to the organization and content of the outreach section of the Physics and Astronomy Department webpage. This month, I added additional features to Hot Off the Press.

In an effort to expand resources and outreach opportunities, I have begun collaboration with PGO at Camp Cullum in Frankfort. I took six of my SMAP undergrad volunteers to PGO for their annual fundraising dinner and to check out the facilities. We are planning to conduct our November SMAP (Observing the Night Sky) at PGO with the camp board of directors taking the lead to prepare and informal dinner of sloppy Joes for SMAP students and parents.

Earth, Atmospheric, and Planetary Sciences Outreach

Faculty and Grad student collaboration included broader impacts and instrumentation

* + - Met with Dan Dawson discussing a portable weather instrument. We are still working on the design. .
    - Collaborated with Prof. Lisa Welp on organizing our Halliburton Foundation  grant (received 8/31/17).
      * We are having EAPS grad students make introductory videos to allow K-12 students to know who they are. Steven Smith has begun recording the videos.
    - Worked with Grant Bonnette on the broader impacts of his NSF Graduate Research Proposal
    - Both EAPS student groups received the service grants the Steven Smith helped them in preparing.

GLOBE (Global Learning Observations to Benefit the Environment)

* + - Planning for the GLOBE North American Meeting and GLOBE Train the Trainer workshop.
    - Attended U.S. Partner Forum meetings
    - Presented and taught activities for Dan Shepardson’s environmental Education graduate course.

AP Friday’s are going strong. Teachers and students are enjoying the events.

* + - We have put together our Spring offerings for this program and teachers are already signing up for dates.

Campus Tour

* + - Outreach is working with Grad students on a self guided tour of our departmental displays including a scavenger hunt of facts form the displays.

School visits went well.

* + - A couple of school visits took place this month and was well received. We are working with Computer science to offer coding in the geoscience to teachers.

Equipment loan

* + - Our participation is Science Express is proving to be beneficial in that we have teachers of college bound students using equipment in our content areas.  The teacher training this month went well and teachers are excited about all of the new EAPS items being included in the program.
    - We also have a number of kits and items that we loan out to teachers and well as university faculty and students. It has proven to be beneficial to EAPS faculty who have borrowed demos and other items for instruction.
    - The Magic Planet digital globe and Solar system display were both used at Kokomo High School.

**Chemistry Outreach**

During the month of October, I met with Libai Huang, professor of chemistry, to discuss ideas she could use as she worked to develop the broader impact section of her NSF grant. I was first introduced to Libai when I met with the Physical Chemistry faculty group to introduce myself and let them know about chemistry outreach as a resource. Libai decided that her broader impact would involve the development of a laboratory experiment over the topic of solar cells that will become part of the AP Friday at Purdue curriculum. AP Friday at Purdue is a program on which I have worked the past few months with Steven Smith (EAPS Outreach coordinator). Libai commented she especially liked that AP Friday at Purdue brings students directly to campus where they can experience a chemistry lab in a college laboratory setting.

After several discussions with the other members of the Science Express consortium related to the HTC VIVE virtual reality equipment that has been purchased by Science Express, we were finally ready to move forward in October with a program where select high school teachers will pilot the equipment in their classrooms. In preparation for this pilot program, I wrote a basic procedure for how to setup the virtual reality equipment. Steven Smith and I delivered the HTC VIVE to Vince Lorenz at Kokomo High School. During his planning period, we met with Mr. Lorenz in his classroom where we were able to show him how to pack, setup and tear down the virtual reality equipment. This is the first time the HTC VIVE has been delivered to a high school. Next semester (February 2018), we will be bringing Vince and several other teachers to the Envision center on Purdue’s campus for an official training on the virtual reality equipment. The goal of this pilot project is to have the HTC VIVE virtual reality equipment available for use with the Science Express program, including lessons for the disciplines of physics, chemistry, biology, and earth, atmospheric and planetary science by August 2018.

This month I submitted a presentation proposal for the HASTI 2018 conference: “Literacy, Science and Your Morning Calendar.” Steven Smith helped me put the proposal together and we hope to present several fun and easy science ideas related to weather, atmospheric chemistry and the GLOBE program to elementary school teachers. I also helped Phil Sands (Computer Science Outreach coordinator) write a proposal for the HASTI 2018 conference: “Integrating 4th grade science and computer science.”

I also spent time this month preparing for my trip to New Orleans to attend the NSF GLOBE Training STEM Equity Bootcamp during the first week of November. I was able to complete online e-training protocols through [www.globe.gov](http://www.globe.gov) and read several suggested articles. Through my work with developing AP Chemistry labs for the AP Friday at Purdue program, I have noticed that many post-lab assignments and extension activities are directly related to environmental chemistry. I am very excited to attend the GLOBE Training in November to learn more about how the GLOBE program can support a high school chemistry curriculum.

For the month of October 2017, the Science Express program made 33 high school chemistry classroom visits and logged 2,751 student/instrument interactions for the discipline of chemistry! I’m looking forward to tracking these numbers over the following months of the 2017-2018 school year.

**Computer Science Outreach**

This month I attended two meetings focused on state efforts to improve computer science education at the K-12 level. The first was as part of my work with ECEP-IN (Extending Computer Education Pathways), which consists of university faculty, state business leaders, members of the Indiana Department of Education, and K-12 teachers. This coming month, we will be delivering a report to Indiana government officials about the current state of Indiana CS education, with recommendations for next steps. I will have more on this item when the report is made public (it’s currently in the last round of reviews). Later in the month, I met with Julie Alano, the Indiana Hoosier-Heartland CSTA chapter president and teacher at Hamilton Southeastern High School in Fishers, to discuss plans for strengthening our CSTA chapter. Attendance at meetings has been spotty, and we used the meeting to brainstorm potential solutions for forming regional groups across the state. The goal is to make it more tenable for a teacher to find supports for their classroom without imposing heavy travel / time demands on them. In addition to our implementation of this plan, we also started looking at opportunities for professional development for teachers in 2018.

The first module of our online AP CS A course, CS180.1x, came to completion this month. My teaching assistants and I implemented a number or upgrades from the previous offering of the course, and additionally supported a cohort of teachers across the country that are using the class to aid their instruction in some way. Our overall number of students decreased from last year’s offering, but we saw good diversity in our student population and were pleased with the number of students that completed course materials. At the end of the month, we launched CS180.2x and currently have about 700 students in the course. My teaching assistants are helping me to package the materials in a way that makes them more usable for K-12 teachers in future years, including a teacher’s guide, solutions, and year-round access to the video content.

Our mentoring service learning group, MAGIC, continued to make weekly trips to all four Lafayette-area high schools. We are working with about 30 students regularly between these four locations. My mentors are designing curriculum and are doing excellent work collaboratively to meet the needs of these students. Adding to our normal activities, we were also able to bring several mentors and students from McCutcheon High School to meet with Girls Who Code CEO Reshma Saujani during her visit this month. It would have been nice to have been invited to attend the reception, and I think that my students would have benefited from the opportunity to interact with Ms. Saujani, but I understand that there may have been concerns about space limitations for the event. Late in the month, we attended the annual Slumber at the Speedway event for Indiana Girl Scout troops at the Indianapolis Motor Speedway. Both MAGIC and ROCS students engaged with Girl Scouts, teaching basic programming ideas and larger computer science ideas over the course of an afternoon. To close a busy month for MAGIC, the students will meet with Professor Roopsha Samanta as part of our course. Roopsha will be speaking with the young women about her experiences in computer science and the path that she took to becoming a member of our department. We have previously had Susanne Hambrusch, Jen Neville, and Sunil himself join us for these informal sessions. I believe that they have a terrific impact on our students, and am hoping that this may convince some of these talented students to consider graduate studies.

My ROCS service learning students took part in four events this month. In addition to the aforementioned “Slumber at the Speedway”, we worked with the College Mentors for Kids campus organization to teach 20 fourth grade students from Linnwood Elementary in Lafayette to code using Scratch, aided a group of computer engineering students in their efforts to host a “Code Café” activity for area high school students, and did our usual monthly meeting with middle school students at the Anvil for CoderDojo. Students are currently working on a new program for November in which we will host local families for a night of coding.

Finally, we are taking steps towards our plans for the test run of the “Day of Science” next Spring, which will be in celebration of the 150th anniversary of Purdue’s founding. I have reached out to many of the same professors who came to me regarding their CAREER grant proposals this summer to gauge interest in participating in the day-long event. Students will choose which areas within the College of Science that they will participate in, and we will ask our faculty members to present an engaging lecture within their research area to set the stage for a hands-on portion to follow. Thus far, I have had interest from Ben Delaware, Roopsha Samanta, and Sanjay Rao from Computer Engineering. If you believe that there are other candidates that should participate, please feel free to contact me. Faculty rarely follow up on their summer interest in outreach, and I’d appreciate the support of the department in getting more faculty to help either with the Spring trial run, or the larger Fall event that we are planning.