**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 December are as follows:

Department       School Visits       Student/Instrument Interactions

Chemistry           8                          399

Biology                 14                        1577

Physics                 3                          77

EAPS                      3                          77

AP Fridays at Purdue continued in the month of December as 28 students (total) from two different high schools traveled to the West Lafayette campus to conduct a Buffer lab. Professor Corey Thompson was available during this lab session to help students with lab techniques and to answer questions.

**Biology Outreach**

Met with Department Head and Asst. Department head (Biol. Sci.) together with College of science K-12 Outreach Director to review University protocols for onsite campus visits by K-12 students.

Attended monthly meeting of Science Express.

Met with Ms. Maurina Baker, President of MANRRS (College of Agriculture Minority Student organization) to explore a collaborative effort to work with Thea Bowman Academy in Gary Indiana. Thea Bowman is a Charter high School with a STEM focus. Biol. Outreach will work with Biology and Ag. Science teachers to improve the school’s advanced science course offerings. Biol. Outreach and MANRRS will meet with Thea Bowman teachers in February and March of 2018 for initial meetings.

Conducted a NMSI. (National Math. Science Initiative) sponsored AP Biology Student Study session for AP Biology Students at Legacy High School I Bismarck ND.

**Physics Outreach**

SMAP – Saturday Morning Astrophysics

December SMAP focused on the characteristics of impact craters, with emphasis on students calculating the combined potential energy (from gravity) and kinetic energy (based on the spring constant of a giant slingshot) of bombardment.

Service learning

Service learning students Guna Kondapaneni and Trey Roob completed the semester, by putting the finishing touches on two articles for publication. Colin Burke worked on revisions for the Impact Craters lesson and activity for SMAP.

Classroom visits

Service learning student David Snyder joined Outreach Coordinator Dave Sederberg for presentations on rotational motion to Debbie Beck’s Physics classes at Jefferson High School.

Earth, Atmospheric, and Planetary Sciences Outreach

* **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.
  + We have a number of kits and items that we loan out to teachers as well as university faculty and students.
  + Imagination Station has our Traveling Solar System Wall on display.
* **Planning for the GLOBE North American Meeting and GLOBE Train the Trainer workshop**
  + Planning has begun for this March 2018 event. We have reserved the John S. Wright Forestry Center for the training and a room in Stewart Center for the meeting. A planning committee of GLOBE partners have been created and chosen the theme of the Pedoshpere.
  + Attended meetings for the GLOBE U.S. Partner Forum.
  + Working with EAPS faculty to get our rooftop weather station going so that it can post data to the GLOBE web site under the Purdue University partnership.
* **Collaborations,  including broader impacts and instrumentation**
  + Dr. Dan Chavas collaborated on the submission of the NOAA Environmental Literacy Grant (NOAA-SEC-OED-2018-2005455) Supporting the education of K-12 students and the public for community resilience
  + Submitted an article with EAPS Alumni Dr. Christopher Roemmele of West Chester University
  + Working with the director of Imagination Station and a local software developer to design an augmented reality experience to accompany our traveling wall displays.
  + Collaborated with Prof. Lisa Welp on organizing our Halliburton Foundation  grant.
    - We are having EAPS grad students make introductory videos to allow K-12 students to know who they are. Steven Smith has begun recording and posting the videos. <http://www.eaps.purdue.edu/outreach/people.html>
    - Dr. David Minton is helping with the videos.
* **Student events:**
  + A fourth grade gifted and talented group visited the department and did a day of hands on activities.
  + 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. <http://www.eaps.purdue.edu/outreach/ap_friday.html>
    - News mentions for AP Fridays
      * [http://www.bannergraphic.com/story/2465837.html](http://secure-web.cisco.com/1-gA2rZWCYUnnyXtDCfgronxHcFVV8-p2EWlJivVzRBIiC0_WMpMEzgKvsgkS0cXGbzu7dqRvuIMhwuPn5-oEWlZLLSnPEQgmQD0JjpSQLuP2QTYSpBvInTwNSz09-uJF5WNP4oZ-U4IOZvjKzFDI0x2y_Qsui0l9IZ-LKfDm-uPVqwa6WB_UFE6Q8OOdMTGKvQPXDffGSoGpjOXpojWMx3LMEeMH-vx2X25j8FYZvAkX49OU5WceuplXmkhZhepuakrK1Y2q3vpFewBO3D1lp1h1dpDKaL6w4Smifx1_eYSSFj4IcowXN01oI7DQWxgVVRMgT4083TVNicQVElActXFXJqYcO7Yn4unrXkU1SoY/http%3A%2F%2Fwww.bannergraphic.com%2Fstory%2F2465837.html)
* Science fair mentoring

Outreach is helping students on projects including carbon storage and parks to human impacts on soil chemistry.

**Chemistry Outreach**

AP Fridays at Purdue continued in the month of December as 28 students (total) from two different high schools traveled to the West Lafayette campus to conduct a Buffer lab. Professor Corey Thompson was available during this lab session to help students with lab techniques and to answer questions. I have been working with Steven Smith, K-12 EAPS Outreach coordinator, to advertise more AP Friday lab sessions. This fall we hosted 155 students from eight different high schools in Indiana, along with their teachers. As of the end of December 2017, we already have 94 students from six different high schools in Indiana along with their teachers signed up to participate next semester. We are hoping that even more teachers will sign up their classes to participate in these lab sessions once school resumes in January 2018.

The Science Express program is excited to be making plans for a virtual reality pilot program that will be conducted next semester. Four Indiana high school teachers from the disciplines of chemistry, biology, physics and astronomy, and earth, atmospheric and planetary science have committed to working with Science Express to develop curricula to support the HTC VIVE virtual reality equipment. I met with George Takahashi from the Envision Center this month to plan a training session for the high school teachers (pilots) that will be working with us. George and the staff at the Envision Center will be working with us to train our pilot teachers in both protocols and best practices for using virtual reality in a high school classroom. Our entire group of high school teachers and outreach coordinators will meet together at the Envision Center in February 2018. In preparation for this event, I have been arranging for on-site training sessions with the four high school teachers that will be involved with this pilot program. This month, I visited the chemistry teacher in our program, Nick Friedman, at his Brownsburg high school classroom. We went over basic instructions for setting up and packing up the virtual reality equipment. We also completed a tutorial for the molecular modeling program. Nick will be looking at developing a chemistry lesson over VSEPR theory to use with his Chemistry I students. It is important that the high school teachers involved with this pilot program are able to use the virtual reality equipment prior to our training in February to ensure that the time they spend together can focus on meaningful discussions over lesson planning with virtual reality in the high school classroom. Following the February training, our pilot teachers will finish their lessons and prepare to train other Science Express users during the summer 2018. Science Express will then be able to offer the HTC VIVE virtual reality equipment on the reservation schedule for trained teachers beginning with the 2018-2019 school year.

I received notification that both proposals I had helped to submit for the Hoosier Association of Science Teachers in Indiana (HASTI) conference in 2018 were approved. I will work with Phil Sands, Computer Science Outreach, to develop a presentation that will incorporate both computer science and science Indiana academic standards for 4th grade students. We will be designing a science experiment that will involve writing code for a BBC micro:bit to collect temperature values and ultimately answer the question: Is a mitten warm? I have been in touch with a local 4th grade teacher who has agreed to let Phil and I test this lesson with her students prior to the HASTI 2018 conference. I will also be working with Steven Smith, EAPS Outreach, to develop a presentation for elementary school teachers to integrate science with the morning calendar and literacy curriculum. This presentation will provide us with an opportunity to introduce GLOBE protocols with the teachers that attend. Participating with GLOBE protocols can help elementary aged students become more scientifically literate. For example, by participating in a GLOBE temperature protocol, students not only learn about temperature, but also what it means to calibrate a thermometer, why it is necessary to calibrate scientific equipment, and how the temperature readings they collect and report to the GLOBE database provides a network of data that can be accessed by anyone in the world.

I also collaborated with Daniel Chavas, assistant professor of EAPS, and Steven Smith, EAPS Outreach coordinator, to write and submit a pre-proposal for an Environmental Literacy NOAA grant: The Indiana GLOBE Weather Network (IGWN). Our vision for this grant is to work with schools in the counties where Science Express is already established to setup a network of weather stations. We will be able to program the weather stations to automatically upload data that is collected to the GLOBE database. The IGWN project will create a network of agencies to inform people about the weather, weather data, how climate change drives natural disasters, and what to expect for their community in the future. IGWN will train teachers in how to use data in their curriculum. Student learning and environmental stewardship will be enhanced by working with the Tippecanoe County Emergency Management Agency to understand mandatory responses during weather related emergencies, and creating a statewide student science symposium for students to highlight research projects based on data acquired via the GLOBE database. Community education efforts will be supported by the Imagination Station and Indiana state parks to train citizen scientists in data collection and create both weather and natural disaster awareness events and programs for Indiana residents. The area impacted by this grant will stretch from Indianapolis to the Southern portion of the Great Lakes. I am especially excited about encouraging students to use data collected from their communities to develop research projects to benefit their communities.

For the month of December 2017, the Science Express program made 8 high school chemistry classroom visits and logged 399 student/instrument interactions for the discipline of chemistry.

**Computer Science Outreach**

The CS180x course completed the second module with roughly 1,000 students working through the online materials. We continue to advertise the course through conferences across the state, and will continue to do this in January at the Indiana STEM conference here on Purdue’s campus.

The week of December that includes the 9th (the birthday of Grace Hopper) is always held as CS Education Week in the United States. In conjunction with this week, my outreach students and I did a number of activities around the state. We visited both Westfield and Carmel high schools in person to meet with their students and speak to them about CS at the college level. At Carmel, we also did a series of short activities with elementary aged students to celebrate the “Hour of Code” that is encouraged at schools across the country. Due to travel limitations, we were not able to visit Milan high school in person, but we did have a short web chat with their students during the week as well.

In addition to these in-person events, we also offered current high school CS students the opportunity to participate in our annual programming challenge. We received entries from students across the state, and will announce the winners this week. The questions are designed to challenge students to solve problems that go beyond what is typically expected of high school computing students, and we encourage students to work in small teams to complete the problems.

Lastly, two of my students and I visited the Indiana Statehouse for Governor Holcomb’s announcement regarding CS Education in the state and the long-term plan. He pledged money for teacher training, and announced a partnership with Infosys that should bring 800 teachers to Indiana next summer for teacher training. I will be working with Nextech, Infosys, and Indiana University to train these teachers and should have more information about this over the coming months (<http://www.infosys.org/infosys-foundation-usa/initiatives/>).