Explore, Experiment, Discover.

STUDENTS IMMERSED IN HANDS-ON RESEARCH WITH FACULTY MENTORS GAIN REAL-WORLD EXPERIENCE.

Student-faculty research is exploding in the College of Science & Mathematics. This summer, almost 200 students and their faculty mentors investigated a wide range of innovative subjects, from new anti-malaria drugs to liquid crystals, from data recovery algorithms to the mating success of the Cuban freshwater fish Girardinus metallicus. They built computer clusters and telescopes, and traveled to the U.S. Virgin Islands and Geneva, Switzerland.

Most importantly, they learned the skills they will need to be professional scientists and mathematicians; teachers who will inspire the next generation to pursue science, technology, engineering and mathematics; and future leaders in medicine or industry.

"Science education today is all about teaching students how to actually be scientists," said Emily Taylor, a biology professor who runs multiple research projects with students. "There's no better way to embrace Cal Poly's Learn by Doing motto than for students to get their hands — or gloves — dirty doing research alongside our faculty."

Mason Dubois got his first taste of fieldwork this summer, investigating the thermal biology of western fence lizards in the southern Sierras with Taylor. "This was a unique

Photo credit: Tenney Rizzo

experience for me," Dubois said. "As a student, I was part of this study from day one: designing the experiment, creating our hypothesis, and then going to the field to collect data to test our hypothesis."

These student-faculty research projects can have real-world impact. Chemistry professor Andres Martinez, three faculty collaborators, and 11 students developed a pencil that health care providers could use to easily and inexpensively test for diseases such as HIV. Users would simply color inside the wax lines on a piece of chromatography paper and add a drop of blood or urine. If the paper changes color, the disease is present. The technique, which has been submitted for a patent, is well-suited for use in developing countries that often lack both funding and facilities.

"Because we wanted to make the reagent pencils available to people in resource-limited settings, I received a lesson in practicality," said Tyler Sisley, who worked in Martinez's lab over the summer. "I had to look at safety data and costs

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Cont'd from pg. 06

to determine whether or not I should pursue certain experiments based on their affordability, environmental contamination and safety. These skills will definitely benefit me later on in industry or research."

"Students start working independently very early on," Martinez said. "They make their own mistakes and learn from them. They also really appreciate having a product at the end of the day. They can see it. They can touch it. It's easy to see how it can be used in the real world."

As part of the research process, students also present their work at professional conferences and co-author peer-reviewed papers. By communicating their results to the scientific community, they not only gain a deeper understanding of what they've accomplished but also gain confidence and build a network of professional connections.

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Vibrant research continues throughout the year, but the available facilities are more limited when classes are in session. With additional space, more research opportunities would be available to students.

The College of Science & Mathematics has the opportunity to partner with the College of Agriculture, Food & Environmental Science on a new research and teaching building that would include 15,000 square feet of dedicated research space. Though a generous lead donor has stepped forward, the college still needs to raise $3–5 million to make the building a reality.

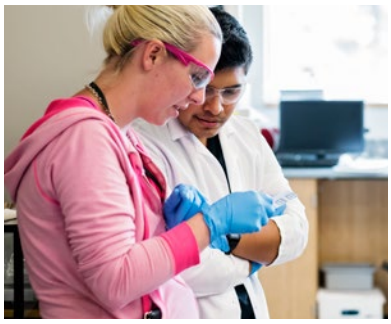
"One of the things that makes Cal Poly special is that our faculty members focus on providing research opportunities for students," said Dean Phil Bailey. "This building is critical to the growth of our student-faculty research program."

Construction is slated to begin in 2018, and students and faculty will begin moving in during 2020.

"We have an excellent student-faculty research program," Bailey said. "This building will help establish Cal Poly as a leader in undergraduate research." //

View related video online at cosam.calpoly.edu/intersections

Pictured: *This summer, student researchers in the Chemistry & Biochemistry Department gathered with their faculty mentors and Dean Bailey (far right) to present their research results at a department symposium.* ***Photo credit****: Tenney Rizzo*



Pg. 5-6: *Professor Andres Martinez and his research group work on the pencils they're developing that can be used as inexpensive, portable health care diagnostic tests. Left to right: Tyler Sisley, Spencer Schultz, Leah Cuellar, Andres Martinez, Alex Cheng* ***Pg.7 Photo 1:*** *Kevin Ahn weighs a potential anti-malaria drug compound after synthesizing and purifying it.* ***Photo 2:*** *Kevin Phung sets up the telescope at the Orion Observatory near Santa Margarita Lake prior to taking measurements of double stars.* ***Photo 3:*** *Amanda Thraen and Salvador Martinez-Vargas compare results while working on an inexpensive, portable health care diagnostic test in Professor Andres Martinez's lab.* ***Photo 4:*** *Natalie Claunch (left) draws blood samples from a rattlesnake to measure the levels of its stress hormones while Kara Jew holds the snake. The students are working with Professor Emily Taylor to learn how stress hormones affect rattlesnake ecology and physiology.* ***Photo credit:*** *Tenney Rizzo*