

ISSUE 7 | 2023

DISCOVERY



CalPolyPomona

College of Science

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DISCOVERY MAGAZINE a publication of the College of Science

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DEAN'S MESSAGE

At the College of Science, we're dedicated to the mission of educating, mentoring and inspiring students through scientific inquiry and hands-on learning.

In this issue of our Discovery Magazine you'll see what students can accomplish when being mentored and inspired. You'll hear how the College of Science serves the community by providing valuable experiences through summer science camps and how collaboration with community colleges is improving math instruction.

You'll learn about research into the mysteries of dark matter and galaxy formation and how new equipment is allowing students to study climate change. You'll also find out about ways you can support this important work by attending events such as the annual Research Symposium each spring or assisting our fundraising efforts.

Enjoy the 2023 Discovery Magazine!

-Alison Baski



OUR VISION

Fostering curiosity and a culture of scientific discovery

OUR MISSION

Educate, mentor, and inspire students through scientific inquiry and hands-on learning

CORE VALUES

- Curiosity
- Integrity
- Collaboration
- Inclusivity
- Innovation

COVER PHOTO: Geology student Sunshyne Santos.

1123 Graduates

990 B.S. Degrees

133 M.S. Degrees



Meet Dr. Richard Rodriguez

The 2023 College of Science Commencement Speaker



When Dr. Richard Rodriguez ('70, biology) showed up for his first day at Stanford Medical School he had doubts. "I looked around the room at other student's name tags and saw that they came from schools like Harvard, Yale, and Princeton. My heart sank. I wondered if I'd gotten in over my head," Rodriguez recalls. That feeling stayed with him until midterms. His grades convinced him he belonged there. "It was clear that Cal Poly Pomona had given me a great foundation. I had all the science education I needed to succeed."

Since Rodriguez was nine-years old he'd wanted to be a doctor. He knew it'd be difficult, so he kept his dream to himself. It may have seemed out of reach for a young man from a working-class family in Ontario,

California to become a doctor. His father, who was a machinist at Lockheed Aircraft told him, "Don't be like me, be like the engineers I work with, go to college."

Rodriguez recalls meeting with his high school counselor who confirmed his grades were good enough to get into a state college. He asked which one was the closest and they told him Cal Poly Pomona. His decision to go to CPP, though based on convenience, was what set him up to succeed and inspired in him a life-long love of learning.

It wasn't all smooth sailing though; Rodriguez recalls being called to the College of Science Dean's office. "I was told I was doing okay, but that my grades were all

over the place. Sometimes I'd get an A, sometimes a C. He told me, 'Maybe you should take some time off to grow up.'" Rodriguez was told he'd need to have his department chair sign a petition if he wanted to continue.

Rodriguez got permission to continue and took the Dean's comments to heart. He started studying consistently and became a serious student. "I was fascinated by what I was learning. I realized how much I had missed by not studying. Some really incredible people worked very hard to figure all this stuff out. I appreciated my professors and what they were able to teach me."

When it was time for him to graduate from CPP, Rodriguez shared his dream of medical school with his professors, who encouraged him to take the MCAT. Still unsure of himself, that encouragement meant the world to him.

Not long after graduating CPP Rodriguez married his childhood sweetheart Adele. They raised three children and have six grandchildren. Grandchild Isabel Rodriguez, is following in her grandfather's footsteps, majoring in biology at CPP.

At Stanford, Rodriguez remembers taking classes from the likes of Nobel laureate Linus Pauling. He was in awe and was grateful that CPP had given him a such great foundation. His love of learning continues to this day and he still loves to read, study, and learn about medicine.

After medical school, Rodriguez, who is Board-Certified in Internal Medicine, went to work for Kaiser Permanente. After several years he was asked to assist with administrative work and rose to the position of Medical Director for Clinical Services in Southern California. Rodriguez found the work of supporting other physicians rewarding. He was later appointed President and CEO of Permanente Medical Group in Atlanta Georgia, where in the short span of a year he was able to turn around the struggling organization.

Rodriguez has held several high-ranking positions that include VP of Medical Affairs for Molina Healthcare, Senior VP Chief Medical Officer of TMC

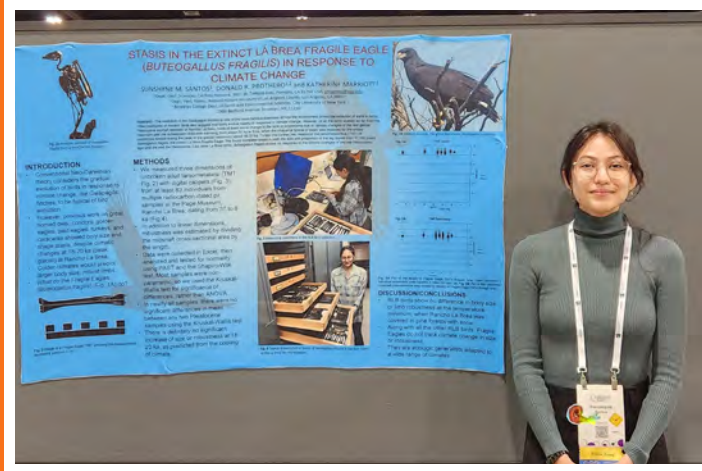
"I think it's important to give because of what CPP gave me. It's a great gift. I'll never be able to give back as much as it gave me."

Healthcare, the largest hospital in Arizona, and Chief Medical Officer of Carson Tahoe Health. He recently retired from consulting work.

Over the years Rodriguez has given back to CPP, supporting scholarships, and special educational opportunities in the College of Science. He's a member of the Dean's Circle which serves as an advisory board to the college and is a vital link to industry and the community. "I think it's important to give because of what CPP gave me. It's a great gift. I'll never be able to give back as much as it gave me," Rodriguez said.

On May 23 the College of Science celebrated the Class of 2023 Commencement. Dr. Richard Rodriguez was the speaker. It wasn't the first time Rodriguez spoke at a commencement. He gave a speech at his own graduation from Stanford, an honor he recalls with pride. Drawing from his own experience, his message was one of triumph over doubt and the confidence that CPP prepares students to compete at the highest level with anyone in the U.S.

Student Gains a Brighter Future by Studying the Past



Sunshyne Santos is a first-generation college student, like over half the CPP students. Neither of her parents finished high school. “Education wasn’t a priority and college seemed like a lofty goal to them, but they were supportive,” Santos said.

Even though her parents had doubts about the prospect of higher education, they provided her with rich educational opportunities. As a child, her mom helped her with her math homework, and Santos recalls her father taking her to museums every weekend. It was visits to places like the La Brea Tar Pits and the California Science Center where she developed her interest in science.

Santos credits her high school experience in the Army JROTC with teaching her discipline and goal setting. It was during that time that she set a goal of going to college.

Santos entered CPP as a geology major but wasn’t sure if she should switch to biology. After taking an Earth, Time and Life class (GSC 1120) she realized her interest was in paleontology which draws from both disciplines. She took every class that CPP offers related to paleontology and got to know part-time lecturer Donald Prothero from the Department of Geological Sciences.

As a mentor, Prothero opened a world of opportunities to Santos, and she lights up when describing her visit to the La Brea Tar Pits Museum with him. “He explained the research that previous students had done with him at the site and I got to see the museum’s collections - things that aren’t on public display,” Santos said.

Santos went on to conduct research with Prothero and published the work in the *New Mexico Museum of Natural History and Science Bulletin* in 2022. The research sought to answer the question of whether Pleistocene (ice age) climate change caused physiological changes in the extinct La Brea black hawk, *Buteogallus fragilis*, translated as “fragile eagle.”

Utilizing the vast collections at La Brea, Santos measured bones that spanned 28,000 years. Another student of Prothero’s ran statistical analysis on the data. Their findings concluded that there was no evidence of physiological change.

Prothero asked Santos to submit her work for presentation at the Geological Society of America Conference in October, 2022. It’s the largest meeting of geologists and paleontologists in the world. At first, Santos didn’t want to do it. He

pointed out the networking opportunities and wanted her to meet his advisor, Niles Eldredge who was going to be speaking there. She reluctantly agreed and their research was accepted.

“I felt nervous going in but was able to bring people over to my poster and the whole experience brought me out of my shell. I gained confidence in my research and myself and I’m glad I did it,” Santos said. At the conference she met Niles Eldredge, and Rowan Lockwood who is president elect of the Paleontological Society. They offered words of encouragement which meant a lot to Santos.

As a first-generation college student, Santos wasn’t always sure she belonged. She learned from her peers how to plan, and what campus resources and scholarships were available. Now she’s able to help her brother who is getting ready to apply to college.

The Department of Geological Sciences is a tight knit group and Santos said, “When you’re on a field trip in the desert, two hours from civilization for three days, you get to know people and make friends.” She also said that Department Chair Jon Nourse has been very supportive and provided an opportunity for her to work over the summer and help with orientation. Prothero shared that although

an undergraduate, “Santos has become a part of the paleontology research group, along with four graduate students. She regularly participates in our weekly paleontology seminar meetings and summarizes scientific papers for the rest of the group when we are researching a topic.”

Santos plans to conduct research on North American rhinos and has a project describing a new species of rhino from the Big Badlands of South Dakota, which Prothero said they hope to publish in 2023.

When asked what advice she would give new students Santos said, “Go out of your comfort zone. Make friends with your professors. I went so long being shy and afraid to ask questions. Talk to people. Don’t be afraid to do it.” She confided that she sent emails to professors stating her intent to visit during office hours. Once she was committed to doing it, she couldn’t back out.

“You need to have people who believe in you to help you through the times you doubt yourself,” she said. “Things happen, including unfortunate things. Remember that lack of success isn’t failure, failure is giving up!”



Award Winning Faculty



KEN HANSEN
KINESIOLOGY &
HEALTH PROMOTION

Distinguished Teaching Award

Ken Hansen began teaching at CPP in 2003, bringing valuable experience as a physical education teacher in primary and secondary education. His areas of interest include affective learning, cultural diversity, and qualitative research design. He fosters active learning and creates a culturally responsive environment with journaling, cultural autobiographies, and case studies. Hansen's students recognize his supportive teaching and share that his classroom is an environment where all feel comfortable participating.



GREISY WINICKI-LANDMAN
MATHEMATICS & STATISTICS

Outstanding Faculty Advisor of the Year Award

Greisy Winicki-Landman recruits and advises mathematics students who are pursuing careers in secondary teaching. For the last 17 years, she has taught the capstone sequence Teaching Mathematics in Secondary Schools and guided students in their short and long-term career goals. Winicki-Landman also organizes the Gift of Numbers, a program that takes CPP students into the community to share math games with children and their families.



CHANTAL STIEBER
CHEMISTRY & BIOCHEMISTRY

Ralph W. Ames Distinguished Research Award

Chantal Stieber is an inorganic chemist who has mentored over 60 students and published more than 20 peer-reviewed articles during her seven years at CPP. She has also acquired grants totaling \$1.6 million dollars in direct support of student research and \$15 million in collaborative grants. Stieber is an exceptional mentor to students, personally training them on state-of-the-art equipment and providing research experiences that prepare them to work in industry or pursue advanced degrees.

College of Science

Undergraduate Students

4,082

Graduate Students

283

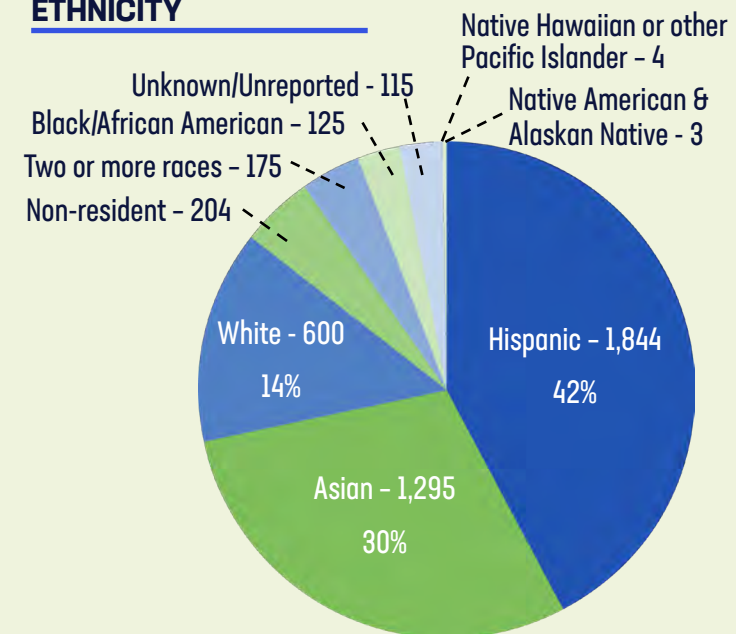
URM

47%

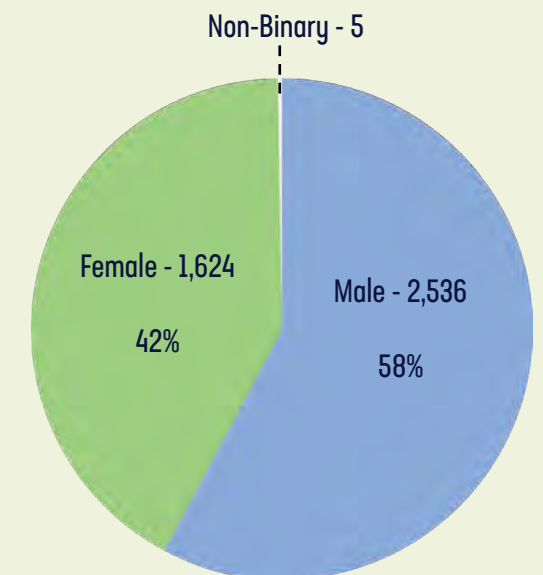
1st Generation

53%

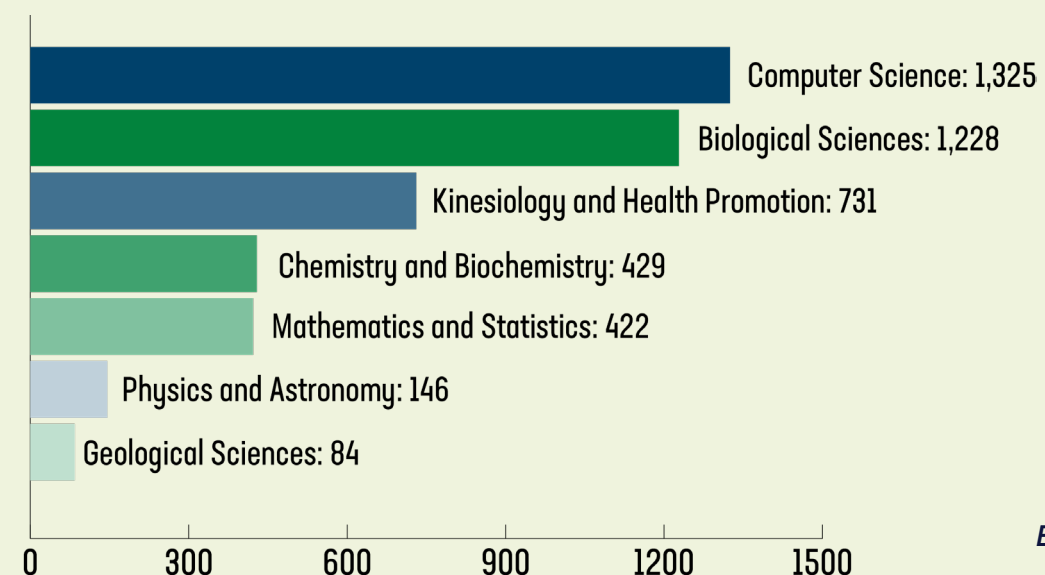
ETHNICITY



GENDER



ENROLLMENT BY DEPARTMENT



TOTAL

4,365

Based on Fall 2022 data

Chemistry Professor Added to Wall of COOL

Associate Professor Kathryn McCulloch was honored by the Center for the Advancement of Faculty Excellence (CAFE). McCulloch was added to their Wall of COOL which stands for Celebrating Outstanding Opportunities for Learning.

The Wall of COOL acknowledges exemplary technology-infused course development by CPP faculty. McCulloch's course, CHM 3280, Biochemistry II, was selected for being well-designed in a way that is both supportive and challenging for learners.

Two things that set McCulloch's class apart are an infographic project, and collaboration with an equivalent course at State University of New York at Cortland. McCulloch said, "The collaboration is with Dr. Hicks who I worked with when we were in school together. We started it during the pandemic so students could meet other biochemistry students."

The infographic project requires students to research a metabolic pathway. Students research what it does, its reaction, how it's regulated, and its enzyme structure. Then they get hands-on experience using industry standard programs like ChemDraw and PyMOL to create an infographic. The experience with the software helps prepare them for work.

"When you ask biochemists, they'll tell you this class is the funnest," McCulloch said. "Though it's one of the most challenging because the chemistry majors have to apply it to biological systems. For biology students, they have to tackle all the mechanisms of metabolism."

In the course, students are developing research skills, collecting information from the scientific literature, and learning how to condense it and present it in a one-page infographic which they present and explain to the class.

In addition to that assignment, students are asked to summarize the modules covered in class. This involves reviewing two weeks of class notes and finding the most important information. It requires critical thinking and finding connections among main ideas.

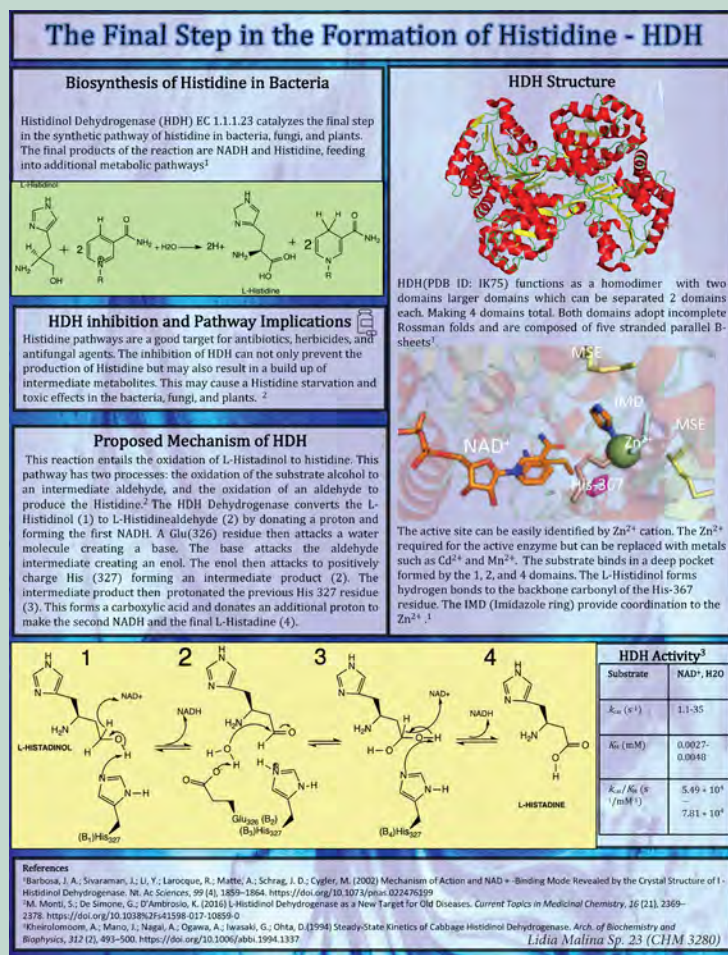
McCulloch has spent a lot of time organizing CANVAS pages and uses the same layout for each module for consistency. During class she annotates her PPT slides on her ipad while students do the same on their slides.

To focus only on technique and technology would be missing something important. One thing that's obvious when you visit McCulloch's class is the exuberance in her teaching. When you see a professor who is so excited about their field and so enthusiastic in

their teaching it's hard not to feel inspired and motivated.

"Her passion for the subject is contagious," said student Melia Moran. "I love how she presents the material. She goes the extra mile by providing additional study resources and repeating difficult concepts to make sure students understand the information. I was so grateful to have her for this class."

"Her passion for the subject is contagious."



Cybersecurity Team Repeats Win

The CPP cybersecurity team repeated last year's win, taking first place at the 2022-2023 Collegiate Penetration Testing Competition (CPTC).

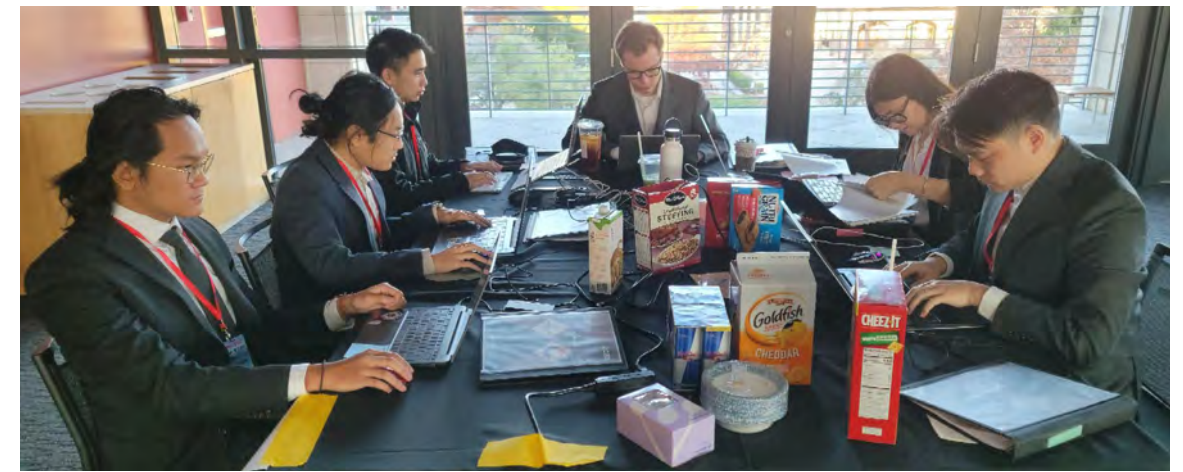
After beating nine colleges to win the regionals, CPP's Cybersecurity team took on 15 finalists to win the final competition. Now in its eighth year, the CPTC asks student teams to hack into the business network of a fictitious company, report on their vulnerabilities and suggest ways to fix them. This year's industry sector was hotel and hospitality.

The team is made up of computer information systems (CIS) students from the College of Business Administration and computer science (CS) students

from the College of Science. This year's team members are team captain Justin R. Covairt, Dylan T. Tran, Taylor S. Nguyen, Derrick T. Tran, from CIS, and co-captain Gabriel Fok, and Jasmine Weddle from CS.

When you talk with these students their excitement about cybersecurity is palpable. "If you didn't love it, a competition like this would be very arduous," Jasmine Weddle said. Weddle, a computer science major, is the first woman to land a spot on the team. "The guys have been great, but I do feel a little more pressure being the first," she said.

Weddle is the business and compliance lead. She's



CPP team at the regional competition in November 2022.

concerned with how their technical work impacts the business, and its legal ramifications. Her fellow CS major Gabriel Fok is the co-captain, business lead and Linux/web specialist.

If there was one word to describe what makes this CPP team so outstanding it would be "preparation." The selection of team members starts with an eight-week bootcamp that's designed and led by fellow students who've already competed in the CPTC. The bootcamp culminates in a mock penetration testing engagement. Top performers are asked to join the team.

"Once the team was finalized we met every week up to the competition to work on our techniques and strategies," Fok said. "All of the free time you have, you're thinking about it. We talk over dinner, and share ideas," Weddle said. "None of us is here for a resume bullet point, or out of obligation; we're here because we find it really interesting and we're passionate about it," she added.

One of the secrets to their success is the template they use for creating their report. Weddle refers to it as their "secret sauce" which she describes as a work of art. To prepare for the final competition, some team members did practice labs on sites like HackTheBox while others conducted research.

The regional competition consisted of eight hours of searching for vulnerabilities. During that time, the team was subjected to injects, which are fictitious employees of the business, making requests or asking for status updates. Then the teams had another seven

hours, until midnight, to write and submit their report. Weddle said, "It's grueling concentrating for that long. There's a lot of pressure, but it's great experience because it prepares you for work."

According to faculty advisor Ron Pike, at regionals CPP submitted a 104-page report that organizers say set a new bar for professionalism. "We have strong academics that provide the fundamentals and our students have benefited from exposure to industry professionals. Most importantly though, we have great students who are very dedicated to learning and supporting one another," Pike said.

Pike has been coaching cyber competitions since he joined CPP in 2012 and started coaching the CPTC team in 2015. "Dr. Pike was great. He drove us everywhere and made sure we got where we needed to be," Weddle said.

The final CPTC competition took place over a 40-hour time period, January 13-15, 2023 in New York at the Rochester Institute of Technology.

After winning back-to-back CPTC titles, Fok said, "Now no one can call us a fluke. Everyone stepped it up this year, including the other teams. I think that just goes to show how talented and dedicated this roster is. It made the hundreds of hours of preparation worth it. My team is truly special, and they truly deserve this win. I'm honored and humbled to experience this win with them. I'm excited to see what happens next year."



The winning CPP team poses with their trophies. Photo credit: Scott Hamilton/RIT

2023 DISTINGUISHED ALUMNA KAREN VAUGHN



Then known as Karen Head, Karen E. Vaughn ('80, mathematics; '82, M.S. in mathematics) arrived at Cal Poly Pomona in 1975 as a freshman math major. She loved her dorm (Palmitas, 3rd West), the Rose Garden, the flexibility to take classes in music and engineering and meeting her future husband, fellow math major Jeff Vaughn, through the National Mathematics Honor Society (KME).

She started graduate studies as well as becoming a part-time lecturer in the Fall of 1979. "I deeply valued the faith my professors had in my abilities to do an excellent job," she said.

Fast forward 39 years: Vaughn retired from full-time teaching in 2018. As a lecturer emerita, she continues to teach one or two classes each fall.

"I am still eager to help students learn to see math in the world," Vaughn says.

She treasured teaching advanced mathematics to aerospace engineering majors and having multiple generations of families attend her classes. While Vaughn knew she wanted to be a math professor back in the 8th grade, she also harbored a desire to be an astronaut. Her interest in flying continued until she earned a pilot's license in her 50s. Not that making time for flight lessons was easy, what with her career, family and the cancer diagnosis while pregnant with her fifth child.

Vaughn understands that students struggle with demands on their time and pressure to excel while they work and borrow money to pay for college. The pandemic magnified the difficulties.

Just don't perceive obstacles as deterrents to your goals, she advises. Rather, make them challenges to overcome. Bear in mind life might not follow the trajectory you think it will.

"Sometimes the actual path you take and where it takes you is different from anything you had imagined," Vaughn says. "Your degree may take you into a new, uncharted yet-to-be defined career. Every journey is different, everyone makes a mark, and every mark is unique."

The Distinguished Alumni Award is presented by the Cal Poly Pomona Alumni Association to honor outstanding achievement in a profession or a vocation, service to a local, national, or global community, or service to Cal Poly Pomona.

Alumni Share Their Experience With Students During *Professor for a Day*

In 2023 we returned to in-person alumni career panels. Professor for a Day isn't a day, it's actually a week of events that happens every spring. Alumni who are interested in the College of Science Professor for a Day commit to being part of a one-hour career panel. Alumni respond to moderator questions, and students have the opportunity to ask questions and get career advice. **The 2024 Professor for a Day (week) is March 4-8.** For more information: bit.ly/Sci-PFAD.



Alumnus Vincent Kong ('98, Physics)
Aerospace Corporation



Alumnus Captain David Serber
'84, aerospace engineering)
U.S. Dept. of Defense, Office of the CIO

Alumni Make a Difference

Giving Day 2023 raised \$19,096 from 74 gifts to support science students.



"I graduated from Cal Poly Pomona with a degree in Physics as well as played four years of women's volleyball. Both gave me the skills needed for a successful career. This is why I am giving back to the CPP Science and athletics departments to help the school and students to grow and thrive."

-Renee Jordan ('89, physics)
Dean's Circle Member

Two opportunities for giving are Bronco Launchpad, October 16-27, 2023 and Giving Day, April 17-18, 2024. Matching gifts given prior to these events support the College of Science and can double or even triple total giving. We also need ambassadors who are willing to ask their social media network to make a donation during the events.

For more information please contact Bill Burrows: bdurrows@cpp.edu, (909) 869-4160

New Sensors Allow Students to Study Climate Change

In order to understand climate change we need to be able to measure carbon dioxide (CO₂) and how plants and terrain affect the amount of it in the environment. Now, thanks to the Air Force Research Laboratory (AFRL) the College of Science has an important tool that will allow researchers to detect CO₂ movement in and out of the environment. The device is called an Eddy Covariance Tower. In addition to measuring CO₂, it will also measure things like temperature, wind direction, and water vapor.

Biological Sciences Chair Erin Questad said, “This project is about remote sensing and this device can be useful in the management of government land.” It’s currently on the Voorhis Ecological Reserve but can be used anywhere to gather data about an ecosystem.

Gases in the air don’t stand still, they’re constantly moving with the wind, which is where the “Eddy” comes from. Eddies carry CO₂ up and down throughout the day. Since plants take in CO₂ during photosynthesis there are fewer CO₂ molecules moving upward during the day. This variance helps scientists understand how much CO₂ is being sequestered.

Biology Professor Ed Bobich, who is working with Questad on the project, said “We’re lucky to have the



Eddy Covariance Tower



A solar panel powers the eddy covariance tower.

Voorhis Reserve. It’s representative of a lot of California areas. There have been changes in vegetation. Coastal sage scrub is native to the area but that’s being replaced by invasive species that are weedy annuals like mustards and grasses.”

Those plants are not as good at sequestering CO₂, unlike sage; they also dry out and die, creating fuel for fire. “We’re looking at how that change is affecting CO₂ exchange,” Bobich added. He will use other sensors to take direct readings of plants and soil to get a complete picture.

Questad said, “The Reserve is representative of many of our natural areas in that it’s surrounded by an urban environment.” Much of Questad’s research has been focused on re-introducing native plants to restore areas that have been devastated by fire. “My students are looking at what species we can include that have optimum CO₂ sequestration,” she said.

Eddy Covariance is a tool most undergraduate institutions don’t have. Questad points out that there’s great value in offering this hands-on experience to students. She said, “It makes them more connected to the research.”

Questad hired a post-doc in August 2023 who will assist her and Bobich in using the data to develop curriculum. They expect to be able to incorporate the data in classes in Spring 2024.

Bobich said, “This is a huge opportunity for students to see what’s happening on the landscape level. People don’t realize how important plants are to climate change. Students will not only learn about climate change, they’ll also learn how to analyze this data. That will prepare them for grad school, or any job, especially work related to land resource management.”

Shining a Light on Dark Matter

Assistant Professor Coral Wheeler from the Department of Physics and Astronomy received a LEAPS-MPS grant from the National Science Foundation. The acronym stands for Launching Early-Career Academic Pathways in the Mathematical and Physical Sciences and is designed to support the work of pre-tenured faculty, particularly at minority-serving, and primarily undergraduate institutions.

Wheeler's research is titled, The Tiniest Galaxies in the Universe as Testbeds of Fundamental Physics.

Wheeler said the work will address questions like, "What is the nature of dark matter? What were the conditions of the early universe? Do galaxy formation models accurately describe all galaxies?"

Wheeler is studying ultra-faint dwarf (UFD) galaxies. Dwarf galaxies have a higher ratio of dark matter to normal matter and their shallow gravitational wells make them much more sensitive

to the specific physics used in the simulation. That's why they're a good place to look for the effects of dark matter.

Dark matter is the term used to describe what makes up the majority of the universe. In the 1930's Fritz Zwicky was the first to make observations that led him to theorize the existence of dark matter, but it wasn't widely accepted at that time. In the 70's Vera Rubin and Kent Ford observed that stars in the outer reaches of spiral galaxies were moving as fast as those in the center. That shouldn't be the case. Rubin's calculations showed there must be around ten times more mass than we can see.

Dwarf galaxies are unique in another way in that they formed much earlier than larger galaxies. They were shaped by reionization but are also a primary cause of it. "One goal is to learn more about the early universe by learning more about the sources and timing of reionization," Wheeler said.

Wheeler's former student, Nicholas-Tyler Howard ('22, physics) said, "When observing UFDs, we find they're mostly filled with ancient stars that formed around the time of reionization. We want to see if the ionizing photons quenched ultra-faint dwarf galaxies."

Early models of galaxy formation go something like this: gas is pulled into a dark matter halo, shock heats, then cools, and collapses into a rotating disk where stars are formed. That model doesn't seem to apply to lower mass galaxies.

Based on the amount of dark matter in the Milky Way there should be hundreds of dwarf galaxies

surrounding it but there aren't. That's called "the missing satellites problem." A better understanding of UFD formation may help us understand why. Wheeler said, "We want to be able to predict what is the smallest galaxy that can form and then test that prediction."

Wheeler's students will be analyzing state-of-the-art GIZMO/FIRE high resolution simulations of dwarf galaxies. The simulations allow them to see changes on a galactic time scale and make testable predictions about low mass galaxies.

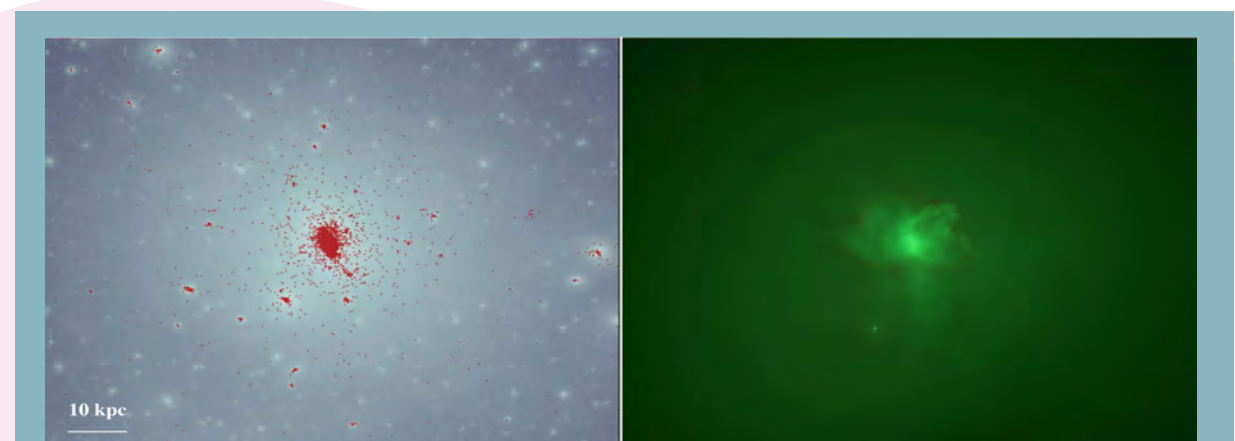
Lastly, the research will look at the effects of the Milky Way on dwarf galaxies. Because of the data involved in such a simulation, the research will only use high resolution for areas of particular interest, so the number of particles is manageable. This will lead the way to future research Wheeler is planning.

One component of the grant is outreach and Wheeler and her students have made presentations at local schools. Their outreach also includes telling students about the Cal-Bridge program. Cal-Bridge is a partnership between CSUs and UC schools to increase the number underrepresented minorities pursuing a Ph.D. in physics, astronomy, and computer science.

Howard credits his work with Wheeler for preparing him for his career. He's an optical engineer at Boeing and plans to pursue a Ph.D. at Vanderbilt. "I learned many valuable skills like how to code, interpret data, be resourceful, know when to ask questions, how to write a scientific paper, and how to present work in an understandable way. She definitely prepared me for the professional world," Howard said.



From L-R: Cristina Flores-Vazquez, Nicholas-Tyler Howard, Coral Wheeler, Tim Kilduff, Demetrius Williams, Jeyson Flores-Velazquez.



Left: Visualization of the dark matter (grey) and stellar distribution (red) of a dwarf galaxy. Right: Gas density for the same dwarf shown at the same scale.

Trustee Scholar Finds Greatest Reward in Teaching

Chiefe Mo ('23, master's in biology) received a 2022 CSU Trustees' Award for Outstanding Achievement. He was named CSU Trustee Chair Wenda Fong and Daniel Fetterly Scholar.

It's no surprise that Chiefe Mo was a high achieving student. In addition to the Trustees' Award he maintained a 4.0 GPA and received the Dr. Edward T. Roche Research Assistant Award Scholarship and the Larry McKane Outstanding Teaching Associate Award. It is a surprise to find out that his first love wasn't biology or science, it was music.

Mo was born in Milpitas, California and was raised by his mother, who immigrated from Taiwan. Mo recalls, "My mother worked three jobs, seven days a week." She had been accepted at UC San Francisco and planned to study medicine but the realities of raising Mo and his brother meant she needed to have income and a schedule that would allow for their care.

The family moved to Houston, Texas when Mo was

nine. Life wasn't easy but Mo confides, "Music is what got me through it all." He learned to play piano and was on track to be a professional musician. He was ranked best pianist in Houston, auditioned for, and was selected to join the Houston Philharmonic.

It was around that time that he learned of his mother's dream to become a doctor, and how circumstances prevented her from pursuing that dream. He changed course and, though he had no previous exposure to science, decided to go to UCLA with a premed focus. "I felt I owed it to her," Mo said.

He began as a chemistry major but changed majors five times and confides that he wasn't a stellar student at UCLA, though he earned his B.S. in microbiology, immunology, and molecular genetics.

Mo was accepted to the graduate program at CPP and joined Jill Adler-Moore's lab. His experience in the lab convinced him that research was his passion. When Adler-Moore passed away in 2021, Mo joined Douglas Durrant's lab.



The work he did with Durrant focused on the neuroimmunological response to West Nile Virus. Mo studied the role of DEC-205 dendritic cells in the brain's response to West Nile Virus encephalitis.

Mo said, "CPP allowed me to show that I can be an outstanding student. I also got the opportunity to teach and attend symposiums. I found all kinds of connections. I couldn't have done it without my lab mentor Dr. Durrant and my thesis committee members, Dr. Wei-Jen Lin and Dr. Jamie Snyder."

Mo was a Teaching Associate, teaching a biology lab in 2020 when COVID-19 required teaching to go online. Teachers had to compete with multiple screens. "I had to think out of the box to keep students engaged," he said. His answer was to play piano for them, writing songs about the study of cells and the diversity of microorganisms, songs that he performed live during class.

Mo said, "I enjoy teaching and presenting research because it's an opportunity to talk about something I like and get paid for it."

Being an out-of-state graduate student at CPP was challenging economically. He was grateful for the Poly Pantry and the awards he received which helped with the bills. He was keenly aware of other student's struggles and emailed his class to find out if there were personal challenges that were affecting their ability to study.

Reflecting on his experience as a Teaching Associate, Mo said, "Seeing someone succeed because you helped them is something that can't be matched. It's a rewarding experience."

Mo Received his M.S. in 2023 and is now working on a Ph.D. at City of Hope.

NSF Grant Supports Partnership with Community College Math Teacher Educators



Associate Professor of Mathematics Anne Cawley received a National Science Foundation (NSF) grant of \$300,000 to partner with community college teacher educators. Her Co-PI on the grant is Associate Professor Cristina Runnalls, who is director of the California Mathematics Project at CPP.

The NSF grant will fund Project (CO)² MPUTE: Community College Mathematics Partnerships with University Teacher Educators. The project aims to improve math education for students planning to teach K-8 math.

“People have the misconception that teaching math at the elementary level is easy but you’re teaching deep concepts that are new to students,” Cawley said. Cawley and Runnalls recognize the

challenges in improving math instruction for future math teachers.

A major challenge is that community colleges and universities don’t always have the ability to communicate with each other about specific courses. Sometimes some courses taught at the community college aren’t articulated, or accepted, at universities. While articulation may be a long-term goal, they plan to start addressing it by building a community of math teacher educators. There’s no quick fix, but communication is a start. The idea is to build a supportive community.

Cawley has an ideal background for this work because she worked at community colleges while also at CSULB and taught a capstone course for elementary math teachers. The experience allowed

her to see, firsthand, how the CSU’s and community colleges aren’t always on the same page when it comes to math teacher preparation.

Runnalls brings her experience running the California Mathematics Project at CPP. In that program she works with current K-12 math teachers. This project will focus on mathematics teacher educators: university faculty who prepare future teachers of mathematics.

The project will partner with three local community colleges. Starting in summer 2023, CPP will provide an intensive one-week institute where community college teacher educators will engage in 35 hours of professional development. The institute will address course content for a numbers and operations course, effective and equitable teaching practices, and state standards that future teachers must utilize to guide their instruction.

The project will also provide opportunities for CPP math graduate students to assist with the summer

institutes. They’ll be exposed to the content which can guide their own teaching and they’ll also learn about professional development from the perspective of development, implementation, and assessment.

Participants will adopt the same textbook for their courses. During the 2023-2024 school year they will meet once a month to share experiences and get feedback. In summer 2024 the participants will meet for another one-week institute to dive into their past experiences and gain a deeper understanding of this coursework and the students they serve. Cawley and Runnalls will receive feedback that will guide future professional development they offer.

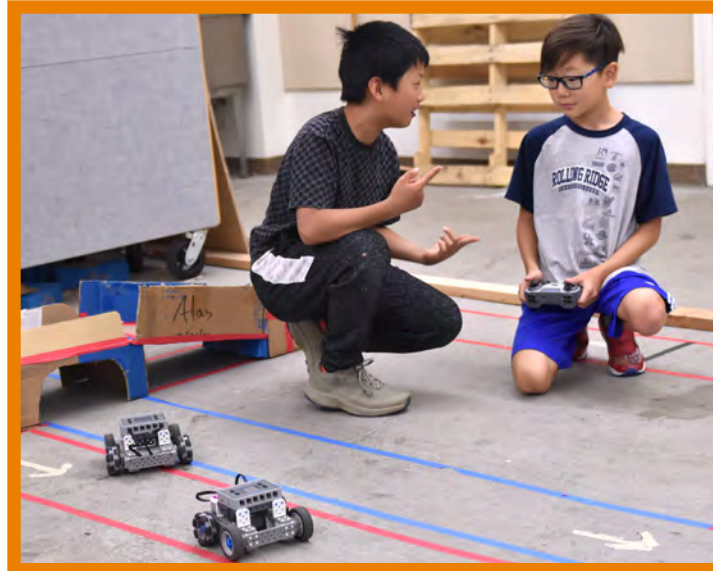
The importance of math education cannot be overstated. It’s a determining factor in success in many fields. Galileo said, “Mathematics is the key and door to the sciences.” The preparation and attitude that K-8 math teachers express about the subject has an enormous impact on student outcomes and those are two key areas this project will address.



Associate Professor Cristina Runnalls



Associate Professor Anne Cawley



Future Scientists Discovered at Discovery Science Camps

Discovery Science Camps offer weekly summer programs for kids & teens 7-14 years old over a seven-week period starting in June. The camps are designed to be fun and include activities and team challenges, as well as arts and crafts. They're also convenient for working parents, with drop-off as early as 7:30 a.m. and pick-up until 5:30 p.m.

Curriculum is guided by Next Generation Science Standards and there are activities in biology, chemistry, astronomy, forensics, physics, and engineering. There are computer, horse, robotics, imagination, and entrepreneurship camps.

"My daughter loved computer camp and robotics camp!" said parent Esther Tanaka. "It definitely opened her interest to engineering, science, and hands-on projects."

The camps are 100% self-supported and are the brainchild of Professor Steve Alas who is also director of Science Educational Enhancement Services (SEES) which supports the success of CPP science students.

Alas started the camps in 2015 and after three years no longer needed to advertise. The horse camps are run by the Arabian Horse Center and the Entrepreneurship Camps are run by the Student

Innovation Idea Lab and registration for all camps is handled through the website: www.cpp.edu/discovery

In 2014 Alas looked at successful summer programs that existed at UCLA, CSU Northridge and CSU Long Beach. The directors of those programs let him sit in on training that was provided to the college students who serve as camp counselors/teachers.

"The camps are a great experience for CPP students who want to become teachers," Alas said. "The camps expose participants to STEM at an early age and



allow the College of Science to serve the community."

Camp Counselor Blossom, which is her camp name, said, "This is an important experience for the kids & teens that they'll remember the rest of their lives. You have a chance to make a difference in their lives." Blossom, who is a second-year computer science student, shared that this is her first job and considers it valuable work experience.

There are a total of 22 counselors for the camps and they receive training in child behavior, and are involved in developing curriculum. For those pursuing a teaching credential, their work qualifies as teaching hours. "CPP students make such amazing counselors because of their knowledge, empathy and enthusiasm. They're great with the participants and parents," Alas said.

"I pull from everything I've learned at CPP," said Mustang (camp name), who graduated with his B.S. degree in biology in May 2023. "It's the first time a lot of them are hearing this material. I think it sets them up to succeed in their studies."

"We had one boy who was really into space. He already knew all about rockets and how they work," Mustang said. "Some of them are really excited about science and others have learned to love it. I definitely see some future scientists."

For more information visit: www.cpp.edu/discovery



"This is an important experience for the kids that they'll remember the rest of their lives."

In Memoriam: Hector Mireles

Physics and Astronomy Department Chair Hector Mireles passed away on Friday, September 16, 2022, after a 14-month battle with cancer. He was 56 years old and is survived by his wife Pilar Diaz Mireles, children Sebastian 13, and Clarissa 10, parents Raquel and Ramon, siblings Luis Ramon, Ricardo, and Lucia Mireles-Chavez.

Mireles joined the University in 2002. He attained his B.S. in physics from UC Irvine and his Ph.D. from University of Texas at Austin and was a doctoral fellow at the Max Planck Institute for Molecular Dynamics in Göttingen, Germany.

“A lot of the things he started are bearing fruit now,” Physics and Astronomy Chair Alex Small said. Mireles was involved in the recent hiring of four faculty. Under his leadership the department conducted lab renovations and started an industry advisory board. He also expanded the role of faculty from different ranks.

“He had the ability to connect with people and bring them together,” Mathematics Professor and friend Arlo Caine said. “He was a statesman and had a flare for oratory. He was a performer and could connect with students, sometimes using Spanish slang, or jokes as he taught.” His wit was legendary, and he could make puns in German, Spanish, or English.

Mireles served as secretary for the National Society for Hispanic Physicists. “Hector took great pride in mentoring Latinx students, who could see themselves in him,” Caine said.

“I’m glad he was there. Hector was one of my role models,” said alumnus Angel Martinez (’09, physics). He suggested Martinez do a Research Experience for Undergraduates (REU) on soft matter at University of Colorado Boulder where Mireles completed a sabbatical.

The REU made him a better student. Martinez earned his Ph.D. and is now Assistant Professor in the Department of Applied Physics and Materials Science at Northern Arizona University. “I owe a lot to him,” said Martinez.

“Mireles was a champion for underserved students and that included women in physics,” said Physics Professor Nina Abramzon. He supported her efforts in co-hosting the Conference for Undergraduate Women in Physics at CPP in 2018.

Hector Mireles was more than a professor and department chair. He was a friend to staff, faculty, and students.



Hector Mireles posed with scholarship recipient Hector Salinas in 2019.



Hector Mireles spoke at the Conference for Undergraduate Women in Physics in 2018.



Honorary mace bearer Sebastian Mireles joined Physics and Astronomy Chair Alex Small in leading the 2023 Commencement procession.

Science Research Symposium



In 2023 over 100 science alumni returned to Cal Poly Pomona to network with former classmates, catch up with faculty, and engage with students who were presenting their research.

The 2024 Science Research Symposium will be Friday, April 26.



Helene Galang and daughter Chloe.

“As an alumni I was able to share my love of science with my daughter through the College of Science Research Symposium. The amazing work that the students are showcasing is an example of what she can do. Learn by doing- truly motivating for both us!”

-Helene Galang (’96, biology)



Bronco Mentoring Program

CPP Alumni:

With just a little bit of your time, you can give students the confidence to go after the career they want.

You're invited to join the CPP Bronco Mentoring Network, our career-mentoring and advice-sharing network that makes it easy for you to connect with others in the Cal Poly Pomona community. The goal of the program is to increase student success by connecting students with alumni who have expertise in their industry, major, or future career.

**Sign up to become
a mentor today!**



Students can
sign up here:



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