CEMaST

The Center for Excellence in Mathematics and Science Teaching

Spring 2024

IN THIS ISSUE

CalPoly Pomona

CEMaST Supports Future and Current STEM Teachers

One of CEMaST's core goals is to be a productive partner and leader in encouraging and providing support to CPP math and science students to consider K-12 teaching. Here are some of the efforts we're making to meet that goal.

MSTI Scholars

The CSU Chancellor's Office has provided **$90,000 in Mathematics and Science Teacher Initiative (MSTI) Funds** to CEMaST for the *tenth year*! Since 2014, Cal Poly Pomona has been receiving MSTI funding to prepare mathematics and science teachers due to the overwhelming demand and the limited pool of qualified teachers. Compared to other institutions, the CSU system produces the largest number of mathematics and science teachers in California and receiving support from the CSU system to provide scholarships to Cal Poly students who are pursuing their teaching credential is a huge draw. *See page 2.*

Right Image: Dr. Jessica Perez shares ways to integrate engineering principles into math and science lessons with MSTI scholars.

Supporting Future and Current STEM Teachers

Continued from cover story

Students in their senior year and during the credential program are eligible to receive $2,500 per semester, up to **$10,000**. Besides the scholarship funds, students attend monthly professional development seminars, have access to personalized single subject advising, support with supplies, and are among the first to receive job opportunities. This year CEMaST currently has **16 MSTI Scholars** in the credential program or finishing their undergraduate degree in math or science.

MSTI STEM Authorization Awards

In addition to providing MSTI Scholarships to mathematics and science majors, CEMaST also reaches out to Liberal Studies students pursuing their multiple subject credentials to add a supplementary authorization in mathematics or science to their credential. The MSTI STEM Authorization Award provides our future elementary teachers with the option to work in a middle school setting teaching mathematics or science. To date, CEMaST has awarded **20 Cal Poly Pomona students** with **$1,000** each to support them while taking the extra mathematics or science coursework.

Computer Science Supplementary Authorizations

CEMaST continued to offer free tuition for **thirty-nine K-12 teachers** completing their **Computer Science Supplementary Authorizations** for the third year. Since there is not a Computer Science teaching credential, teachers must establish content proficiency by earning units in Computer Science coursework. Ten upper division units of computer science coursework through our program at Cal Poly allows K-12 teachers to obtain this supplementary authorization. Coursework is 100% online, during the evenings, and does not require any experience in computer programming! Tuition for this program is paid using MSTI funds but also a wonderful philanthropic gift from SchoolsFirst FCU.

Revisiting and Revamping Recruitment Strategies for Future Math and Science Teachers

It's important to recruit new STEM teachers to meet the demands of the state of California. Each semester, Dr. Beardsley and Jeanne Reynaga, the Teacher Preparation and Recruitment Advisor in the College of Education, hold *How to Become a Math or Science Teacher Seminars*. These meetings explain the steps of the Cal Poly Pomona credential program, meet the math and science advisors, and share scholarship opportunities for future teachers. But we want to learn more about other approaches. *Continued on page 3.*

Image Above: CPP STEM faculty sharing teacher recruitment ideas.

Supporting Future and Current STEM Teachers

Continued from page 2…

During the Spring 2024 semester, Paul Beardsley, CEMaST Director, spearheaded meetings with the College of Science and the College of Education faculty and staff to brainstorm new ideas on how to revamp recruitment strategies for future math and science teachers. Some of the ideas were to increase outreach to diverse students, develop pipeline programs with local districts, build outreach programs to community colleges, create a Future STEM Teachers Club, and more. The meetings were well attended by various members of both colleges and plans on how to best use resources and strategies will lead to a plan of action. We are excited to continue these conversations with both colleges. ***If you have ideas about ways to enhance our teacher recruitment, please share!***

Thank you, Mai Tran!

A tremendous thank you to Mai Tran who completed her final project with CEMaST! Mai joined our office in 2015 as the Project Coordinator for the Reinvigorating Elementary Science through a Partnership with California Teachers (RESPeCT) Project, a $7.7 million-dollar seven-year NSF grant that included partners at Pomona Unified School District and BSCS Science Learning. Mai's work on this project was nothing less than astounding, keeping track of hundreds of teachers, thousands of student tests, and a complex curriculum with two full sets of lessons for grades K-6 and professional development guides (available here).

She continued as the Project Coordinator with the **P**olytechnic for **A**ll: **S**TEM **S**uccess via an **I**nclusive Institut**ion** (PASSION), a $1.5 million-dollar NSF Hispanic Serving Institution five-year grant with principal investigators in four different colleges and programs. Again, Mai's level of quality work on this project exceeded every expectation. Her knowledge of computer programs, technology, teamwork, and her organizational skill will be greatly missed! Both projects were huge undertakings for Cal Poly Pomona and CEMaST team and we could not have done these projects without Mai's dedication and commitment. Luckily for CPP, Mai is still here at the university. She is now the Program Manager in Academic Innovation and currently working on the CPP INVESTS NSF grant. We are very lucky to have worked with you Mai!!!

Image Above: Mai Tran,
Program Manager, Academic Innovation

Alum Spotlight: Adrienne Spina

We are always excited to celebrate the success of our graduates. Let's get to know a little more about one of our own!

***Q:** What year did you graduate from CPP?*

I received all my education at Cal Poly: BA **2008**, MS **2009**, Credential and student teaching at Pioneer Junior High, Upland USD, 7-8 grade Algebra **2010**

***Q:** What is your work experience since graduating from CPP?*

After completing student teaching, I was hired into full time position at Pioneer Junior High School and have been there ever since.

***Q:** What about your training at CPP do you feel especially prepared you for your career?*

Networking with other people, the experiences I had at Cal Poly Pomona, and the advice I received especially helped. The professors were wonderful! They were terrific mentors and offered fabulous advice and informational sessions. At first, I wanted to be a mathematician instead of a teacher, but I was talked into thinking about teaching. Two tremendous experiences were the Noyce Scholarship Program and the Gift of Numbers with students in K-12.

I have a deep appreciation and gratitude to those I met at CPP. The faculty were fantastic not just as advisors. They helped me make connections with faculty and other students which is more fun than doing everything alone. There were math support groups where we had many experiences - escape rooms, board games, glow in the dark mini golf, gatherings to stay connected, and talks about math careers (and happenings). I love having CPP students at Pioneer Junior High School for Math Night or Day of Numbers. Please contact me if you are looking for observation hours!

***Q:** Why did you choose to teach at a middle school?*

I'm still in touch with my CPP cohort colleagues. Many teach at a community college and want me to join them. When I tell them why I teach middle school, they agree I'm in the right place. I was a student teacher at both a middle and high school. Teaching 7th and 8th grade algebra was the best experience. I can be "loony" to help students (sing, dance, be dorky) because they are at the age where "I cannot do it" clicks in. I can have the biggest impact with these students, and I can be their biggest cheerleader! Find a way to engage them! Entertain them! Make it fun! You can make a difference!

Interview continued on page 4.

Image Above: Adrienne Spina

Alum Spotlight: Adrienne Spina (Continued from pg. 3)

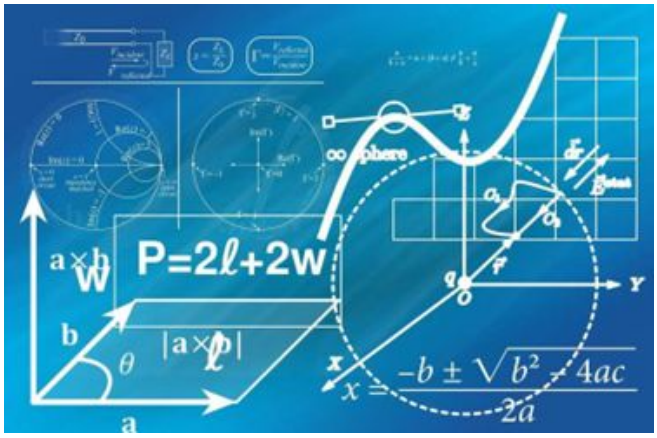
Q: *What advice would you like to share with current students on track to become teachers?*

I love what I do and am passionate about what I do. If you are not passionate about it and do not like it, the students know that. Wear your heart on your sleeve. Teaching is about loving what you do and wanting the students to succeed. You want your students to love your subject as much as you do. Go to learning workshops and/or math/science conferences for teachers. Use their best ideas in your classroom.

Work with your colleagues! My teaching team is the strongest on campus. We work well together plan out pacing guides and take turns in planning for the grade level group. We share ideas, plans, worksheets, songs, and activities. It is very collaborative. My team has a good balance in capabilities and strengths, so the sum of whole is stronger than sum of parts (we each have different strengths). We are known as the problem solvers. When parents complain about Common Core (why do students need to show their work other than using algorithms?) we point out that problem solvers are needed throughout society. We are training problem solvers!

CPP Physics and Astronomy Department Joins the 5+ Club!

California needs more math and science teachers and physics teachers especially. Although the number of high school students taking physics continues to climb, most colleges and universities graduate fewer than two physics teachers per year. The Physics Teacher Education Coalition (PhysTEC) recognized Cal Poly Pomona's Physics and Astronomy Department for their nationally outstanding efforts to help bring more physicists into the classroom by putting them in the "5+ club." The 5+ club is for universities that graduate five or more physics teachers within three academic years. In 2011, Physics Professor and CEMaST Fellow Homeyra Sadaghiani and team started the PhysTEC program which includes a Learning Assistant Program. At that time, CPP was graduating an average of one physics teacher over three years. Now, by graduating at least five physics teachers, Cal Poly Pomona has become a national leader in addressing this critical shortage and is among the top 20 universities who have received this award. Congratulations to Homeyra and the department! Read more about the award here.



Above Image: Pixabay/CC0 Public Domain

Image Above:
Kyle Hood
Future Physics Teacher

Image Below:
Blake Eaton
Future Physics Teacher

Are you interested in inspiring the next generation of STEM students?

Become a Math or Science Middle or High School Teacher

Consider a career teaching math or science to middle or high school students! The Center for Excellence in Mathematics and Science Teaching has ***financial resources available and provides the guidance needed*** to help students obtain a *single subject math or science teaching credential*.

Cal Poly students are encouraged to schedule an appointment with CEMaST's math or science advisor early in their educational path to learn the requirements and help navigate the process of obtaining a teaching credential. During these one-on-one advising sessions, students learn they can take up to four credential courses during their senior year or four courses during the summer after graduation, allowing them to complete the credential program in one year.

Advisors:
Dr. Paul Beardsley (pmbeardsley@cpp.edu) for science
Dr. Cristina Runnalls (ccrunnalls@cpp.edu) for math

CEMaST offers the Mathematics and Science Teacher Initiative (MSTI) Scholar Award to seniors and students in CPP's credential program. Students are eligible to receive **$2,500 each semester** for four semesters **up to $10,000**. The MSTI program provides support, professional seminars, interaction with peers and mentors, and resources to students as they complete their credential. The $4,000 *Partners in Education (PIE) Scholarship* is also available to credential students during Clinical Practice. For more financial resources – contact CEMaST at cemast@cpp.edu.

MSTI Scholar Award deadlines:

- Summer Semester: April 15, 2024
- Fall Semester 2024: May 3, 2024
- Spring Semester 2025: October 18, 2024

To learn more about Cal Poly's credential program, CEMaST and the College of Education host regular orientation sessions each semester. The sessions offer students the opportunity to learn more about the credential programs, application process, program admission requirements and provides time for additional questions. For orientation dates and time, visit the College of Education's website Information Sessions. You can register by completing the Google form or contacting Jeanne Reynaga jmreynaga@cpp.edu.

Credential Orientation Information

Basic Credential Orientation

Credential program application deadlines fall on the following dates each year:

- Fall – April 1
- Spring – September 15
- Summer – February 1

Right Image: Cal Poly students at a teacher professional development workshop.

The 6th Year of the Prete Fellowship Program

Connecting STEM Undergraduates & K-6 Students to the School Garden

The Center for Excellence in Mathematics and Science has once again received **$100,000** in funding from the Ernest Prete Jr. Fellowship program which provides opportunities for CPP students to tutor and provide support at Kellogg Elementary School within the Pomona Unified School District for the sixth year. Dr. Janel Ortiz, CEMaST and Biology Professor, is the coordinator of this program.

While working as a Prete Fellow, CPP students can explore if teaching matches their career aspirations. Each fellow is matched with a classroom and assists the teacher with daily lessons and activities. Students may work one-on-one with elementary students or in a small group setting. The end goal is to have the fellows prepare and teach a lesson to the entire class tied to the school's garden to support the *sustainability of urban gardening*.

The fellows attend monthly lesson planning workshops to learn how to create lesson plans using a teaching template and are provided with a budget to purchase materials for their lesson. This immersive experience provides invaluable opportunities for CPP students to gain practical teaching experience, classroom management skills, and helps those interested in becoming future teachers prepare for their career!

2023-2024
Prete Fellows

Angelina Valencia
Gabbi Lewis
Dylan Hoang
AJ Alpert
Andrew Armstrong
Penelope Luong
Teresa Aquino Diaz
Andrea Alcaraz
Luis Aguilar
Vanessa Villasenor
Alexa Masi
Benjamin Segura
Ashley Palomares
Ariana Meza
Casey Pua (Mentor)
Victoria Bruno (Garden Coordinator)

Each Prete Fellow receives a **$5,000 stipend** to help support them as they continue work on their undergraduate degree at Cal Poly Pomona. To assist and provide support at Kellogg Elementary School, a former Prete Fellow is selected as a Prete Mentor to work alongside each fellow to answer any questions that arise during their fellowship. In addition, a Garden Coordinator is hired to assist fellows with their garden lessons, maintain the Kellogg Garden, plant seasonal plants, and teach and raise awareness of sustainable gardening. This year we welcomed a new principal to Kellogg, Esmeralda Vargas, who has embraced the fellows and their involvement and commitment to Kellogg students. We have also expanded the program beyond the College of Science this year to include students from Engineering, Agriculture, and Liberal Studies bringing us a diverse group of ideas and expertise to share with Kellogg Elementary students.

Far Left Image: Fellows working in the Kellogg garden

Left Image: Fellows participating in one of the workshops.

CEMaST Faculty Fellows

CEMaST will be recruiting Faculty Fellows for the 2024-25 school year! The goals of the faculty fellows program are to 1) support CPP faculty in discipline-based educational research in STEM and STEM-related outreach to K-12 settings, 2) encourage CPP faculty to collaborate with CEMaST on projects consistent with our mission, and 3) build community with faculty across STEM and STEM-related fields.

As a CEMaST Faculty Fellow you will have:

1. An opportunity to apply for seed funding (up to $2000 for one year of funding; brief application required)
2. Access to workspace in the CEMaST office (with a computer and educational data analysis software),
3. An interview room in 4-A-645 for research use,
4. Access to K-12 outreach supplies, and
5. Connections with K-12 contacts.
6. To nominate yourself or a CPP colleague as a Faculty Fellow, visit our nomination form.

Interested in being a fellow or nominating a CPP colleague? Keep an eye out for the nomination form and brief application due April 19!

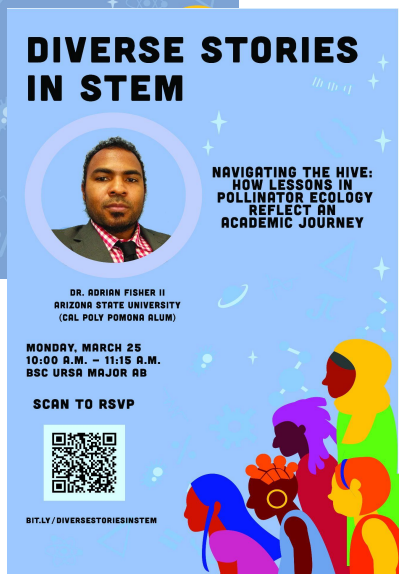


Image Above & Right: Flyers distributed to promote the Diverse Stories in STEM event.

Broadening Representation in STEM

Scholars of Color Share their Stories

Led by Drs. Eeman At-Taras (Animal Science), Rachel Blakey (Biological Sciences), and Janel Ortiz (CEMaST), the Diverse Stories in STEM Speaker Series has brought two scholars of color to share their experiences and paths in STEM with our students.

In Fall 2023, Dr. Christine Wilkinson shared her work on the urban coyote in California and hyenas in Kenya. More recently, Dr. Adrian Fisher II (Cal Poly Alum) shared his work focusing on honeybees and their decline due to fungicides. With over 200 attendees at each session, being a mixture primarily of students but also faculty and staff, the hope is to increase the representation of diverse voices in STEM and let our students see themselves in STEM. Ongoing research is being conducted to see if this speaker series impacts students in their belonging, science identity, and representation in STEM. This speaker series was funded by the SPICE Grant Student Success Fee. We look forward to more Diverse Stories in STEM!

Relevance Matters!

Motivation Intervention Improves Calculus & Physics Student Interest, Engagement, Achievement, and Flourishing

Some courses in science, technology, engineering, and mathematics (STEM), come at critical times in a college student's career journey. Success in these courses can propel students to finishing their major well and start their STEM careers strong. A team of experts at CPP, led by Dr. Viviane Seyranian, Associate Professor of Social Psychology at Cal Poly Pomona, that also included Physics Professor Nina Abramzon, Philosophy Associate Professor Alex Madva, CEMaST Director and Professor Paul Beardsley, and Assistant Professor Ian Thacker at the University of Texas, San Antonio, examined data and discovered two such courses to be Calculus 2 and Calculus-based Newtonian Physics. These courses have relatively *low passing rates*, so the team decided to try a **motivation-based intervention** and study its impact using a rigorous randomized, controlled experiment. This work was funded by a **five-year, $1.5 million grant** from the National Science Foundation (award #1832405), Paul Beardsley Principal Investigator.

Undergraduate students' motivation and sense of belonging play an important role in their STEM success, so the team developed a short assignment called a utility value intervention. Utility Value interventions are interactive classroom-based assignments that help students make connections between their lives and the content they are learning. In the experiment, over 450 undergraduate students in either Calculus II or Calculus-based Newtonian Physics were randomly assigned to either read essays written by peers emphasizing the usefulness of their coursework in their daily life or to a control group. The team generated quotes for the courses by conducting focus groups with former students in the courses who were asked to write about how content from the course might be relevant to their lives. Twice during the semester, students in the treatment group were asked to read three student quotes, rate the degree to which they liked the quote, and rank quotes from most to least favorite. The whole intervention took less than 20 minutes.

It seems hard to believe that such a short assignment could make a difference. But it did. The team found that students who did the assignments had an **increased sense of purpose for the course content, and higher midterm and final grades**. The team also measured students' sense of flourishing at the beginning and end of the course. Flourishing is a measure of a person's state of being free from illness and distress, their fulfillment in life, their sense of accomplishing meaningful and worthwhile tasks, and connecting. It turns out that student participation in t**he utility value assignment significantly predicted end of course flourishing too.** In short, motivation matters!

This work was presented at the annual meeting of the Psychology of Math Education (PEM-NA), Reno, NV and is about to be submitted to a journal.

Learn more about the activities in the grant by watching this short video.

Seyranian, V., Thacker, I., Abramzon, N., Madva, A., & Beardsley, P. (2023, October). A Utility Value Intervention to Support Undergraduate Student Interest, Engagement, and Achievement in Calculus and Calculus-Based Physics.Presented at the annual meeting of the Psychology of Math Educaton (PEM-NA), Reno, NV.

Image Above: Dr. Seyranian (standing) led the Utility Value work at Cal Poly Pomona.

Improving CPP Math Student Outcomes by Helping CPP Math Instructors Focus on Student Motivation

Low student success rates in lower division math courses greatly impacts **student success** at Cal Poly Pomona and all universities across the country. To help address this issue, CEMaST director Paul Beardsley, two CPP mathematics faculty, Sanaa Saykali and Arlo Caine (CEMaST Faculty Fellow), partnered with Dustin Thoman and Allison Vaughn at San Diego State University and the Motivate Lab, headquartered at the University of Virginia and led by Chris Hulleman to offer the ***Motivating Learning Course (MLC)*** to math faculty. The MLC is an online & asynchronous learning experience that equips faculty with motivationally-supportive tools and language centered on strategies such as Growth Mindset, Purpose and Relevance, and Sense of Belonging to create a classroom environment that supports students to develop adaptive beliefs about learning and school.

The team used **$175,000** in funding from a CSU Creating Responsive, Equitable, Active Teaching and Engagement (CREATE) Award (Dustin Thoman Principal Investigator, Paul Beardsley and Allison Vaughn Co-Principal Investigators) and a five-year, $1.5 million grant from the National Science Foundation (award #1832405, Paul Beardsley Principal Investigator) to offer the course to 25 math faculty at CPP. This is a part of a much larger effort to offer MLC at CPP—by the end of the semester over 130 faculty will have completed the program! For the math specific offering, Sanaa Saykali, Arlo Caine and Paul Beardsley served as course mentors.

What impact did the course have? Dustin Thoman led a team effort to evaluate the course's effects on CPP faculty and students. Here's what they found:

Instructor reactions to the MLC. Participants were asked if they found the course to be valuable and an impressive 100% of responding instructors reported "Agree" or "Strongly Agree." When asked how likely they would be to recommend the course to others (out of 10), the mean score was 9.4. It's safe to say the course was well-liked.

Impact on students. The impact of MLC was evaluated using grades and pass rates of 3,118 students, comparing students whose instructors participated in MLC (25 instructors) to students in the same math courses whose instructors did not (35 instructors). Students in the courses taught by MLC math faculty earned higher grades and were more likely to pass the class and achievement gaps were reduced. Follow-up analyses showed that although comparisons across groups were not statistically different, students from underrepresented minority backgrounds and students who are Pell grant recipients tended to benefit the most from taking math courses from MLC instructors. All good evidence to continue the motivation revolution at CPP!

Image Above: Sanaa Saykali leading motivated students in Linear Algebra. Sanaa was one of the faculty fellows in the Motivating Learners Course for math faculty at CPP.

CEMaST

The Center for Excellence in Mathematics and Science Teaching

UPCOMING EVENTS

Equity in Practice Symposium by CAFE on Friday April 19, 2024 – Click here to register

CUREs/ALEs Learning Community (Contact Dr. Winny Dong (winnydong@cpp.edu))

BroncoBound Open House, Saturday April 13, 9am-2pm

Artificial Intelligence (AI) Conference, Wednesday April 17, 2024, 9am-2pm

2024 Summer Conference: Future of Work by Academic Innovation on May 29-31, 2024

Want to be featured on our next alum spotlight?

Tell us more about you and your path here!

The CEMaST Newsletter Committee welcomes news from faculty, students, and teachers. Please contact us at cemast@cpp.edu for information on how to be included in an upcoming issue!

Visit us online at
www.cpp.edu/~cemast

Mailing Address:
CEMaST
Cal Poly Pomona Building 4-2-515
3801 West Temple Ave
Pomona, CA 91768

Office: 909-869-4725
Fax: 909-869-4616
E-Mail: cemast@cpp.edu

CalPoly Pomona