Mission

The College of Natural Sciences Education & Outreach Center is an incubator for innovation in STEM education.

We serve both CSU and 4th-12th grade students and faculty through a variety of programs. Many of our programs focus on authentic scientific research experiences that aim to promote enthusiasm for the STEM disciplines, especially for students traditionally underrepresented in these fields.

Particular emphasis is on finding new ways to promote scientific creativity and innovation, attributes essential for global challenges in the 21st century.
Discovery Begins Here

The Natural Sciences are relevant to everyone. However, STEM (Science, Technology, Engineering, and Mathematics) subjects are not always presented in school in a way that captures imaginations and inspires students to pursue STEM careers. This is especially true for female and minority students.

Our solution to this problem harnesses the intellect of the College of Natural Sciences faculty at CSU. In addition to teaching, they are actively conducting basic and applied research relevant to the needs of society. We collaborate with these faculty to translate their top research into unique STEM experiences and kits for 4th through 12th grade students that aim to inspire the next generation to want to learn more about the sciences. Our programs have reached students and educators at all levels – local to global.
News from the Director

Here is just a sampling of what we have been up to this year:

New STEM Kits on the Horizon
We have several exciting new kits in the works: scrub jay beak micro-evolution with Cameron Ghalambor and Chris Funk, magnetic imaging with Joe Zadrozny, mathematics of optimization with Patrick Shipman, dissolved salts with Ryan Bailey, chemical test cards with Chuck Henry, antarctic rift zones with Dennis Harry, microscopy with Tim Stasevich, and pollinators with the Gardens on Spring Creek.

STEM Kits in Todos Santos
Ursula Quillmann almost got washed away trying to photograph our new STEM kit at the beach in Todos Santos! The “Plankton to Plastic Pollution” kit traces the origin of plastic back to marine plankton and follows it full-circle to it’s recent discovery in zooplankton. The CSU Center in Todos Santos has a classroom set of these kits to use with local schools. We have also made classroom sets for Semester at Sea, Kaloko-Honokōhau National Historical Park in Hawaiʻi, and the EOC. Andrew Allsup (B.S. Natural Science Ed., 2021) and Zoē Tauxe (B.S. Psychology, 2019) were the primary designers on the kit and presented their work at the 2019 CURC, winning 3rd place in the Service Learning category!

National Western Water Building
CSU is collaborating with Denver Water and a number of other partners on the design of a new Water Building at the National Western Center in Denver slated to break ground in early 2020. I have been leading the CSU side of the water education facility design, with plans to establish a STEM kit lending hub and a GetWET experience along the South Platte River.
Twenty Years of CSEF!
2019 marks the twentieth year that Courtney Butler has been the director of the Colorado Science and Engineering Fair! She has solidified the fair’s presence at CSU, significantly expanded the annual budget through fund raising, raised the stature of the Colorado fair relative to other states, and holds a leadership position at the Intel International Science and Engineering Fair. Other states routinely seek Ms. Butler’s advice as they work on improving their own fairs. Her passion for seeing students reach their potential is what keeps her going!

GetWET Grows
In collaboration with Mr. Kaleo Chung, chair of the science department at Rocky Mountain High School, we received funding from the Poudre School District to double the number of field equipment backpacks. Our existing backpacks have also been completely overhauled. The GetWET program model has been honed over ~12 years and will be used in the National Western Water Education program that we are helping to design.

New Solid State Chemistry Kit
During the summer of 2018, BSNS student Antoinette McIntosh Smith (B.S. Chemistry/B.S. Natural Science Chemistry Ed., 2018) did a “Research Experience for Preservice Teachers” in the Neilson Lab. In addition to shadowing graduate students, she developed a new kit with the help of the EOC called “High-Tech Rocks!” It is one of our most multi-disciplinary kits and is proving to be highly popular among teachers.
Collaboration with the Gardens on Spring Creek
The close proximity of the GetWET site to the Gardens makes for a natural collaboration, especially given our mutual collaborators of Compass School and Rocky Mountain High School. Our first project together will be a new STEM kit on Pollinators.

National Park Service STEM Kits
In November, we returned to Kona, Hawai‘i to work with our partners at Kaloko-Honokōhau National Historical Park. We spent the first day organizing the STEM kits that we have in place at the park. The next two days, we visited 11 classes at Kealakehe Elementary School, Kealakehe High School, West Hawai‘i Explorations Academy, and ran a teacher professional development workshop on the beach at the park. The final two days were spent running a water cycle session at the annual Children's Cultural Festival attended by ~400 4th graders. We also shipped two more classroom sets of Vital Ice kits to Denali and Kenai Fjords National Parks in Alaska.

Platte River Power Authority Supports STEM Fridays
PRPA provides our electrical power and also provides funds to power our STEM Friday program! Transportation expenses are a major barrier for many schools and PRPA’s continued generosity helps keep the program going.

Every week we meet new undergraduate, graduate, post-docs, faculty, and community members interested in STEM outreach. Their passion helps energize us as we work towards making science more accessible to everyone.

Andrew
Andrew Warnock, Ph.D., Director
“There is a theme to all of the educational opportunities that the CNSEOC provides. Whether it is field research or investigations performed in the classroom, they ask students to seek natural patterns based upon observations, data collection, and analysis. The CNSEOC develops and shares educational experiences that model critical thinking skills central to promoting the advancement of science.”

— Mike Viney, Retired Science Teacher, Blevins Middle School
Research questions, data collection and analysis, interpretation, and scientific communication are the basic elements that weave through each of our programs. Mathematics, culture, and place are used to help connect students to the science.

**STEM Fridays**
Pre-service science teachers help facilitate weekly hands-on experiences for 4th through 12th grade students and their teacher in our high-tech experiential learning lab or in the field at our GetWET water science site.

**Colorado Science and Engineering Fair**
As one of the top state science fairs in the nation, we draw on thousands of middle and high school students from the best teachers across the state of Colorado. The fair encourages authentic student driven research mentored by leading scientists and engineers. (www.csef.colostate.edu)

**Keynotes and Workshops**
We host a variety of keynote lectures or hands-on professional development workshops attended by CSU and K-12 faculty and students, as well as informal educators.

**SciTrek**
Our summer camp for high school juniors and seniors from around the country is a capstone experience where students contribute to our ongoing tree ring research project at Lory State Park.

**Triunfo STEM**
This year we piloted a new STEM experience for the 5th graders in our Triunfo Mentoring Program. Fifth graders alternate between a STEM kit one week and a hands-on math activity the next week. Each semester we also take them to a research lab to see researchers in action.
Krithik Ramesh won first place at this year’s Colorado Science and Engineering Fair and went on to win first place at the Intel International Science and Engineering Fair! We are incredibly proud of his outstanding achievement which came with a $75,000 scholarship. The rigorous review of all projects by our scientific review committee allows success stories like this to happen.
The STEM Kits that we create are derived from the research projects of CSU faculty. We delve into their research methods to find the essence that we distill into an educational kit. How does the researcher approach a problem? What sorts of experiments are used to solve the problem? How can we give students the joy of discovery? These are the elements that make a great educational experience. Kits focus on scientific process, scientific illustration, data collection and analysis, and communication of results.

We develop several categories of kits:

**Broader Impacts/CAREER**
Faculty seeking funding from the National Science Foundation are required to have a concrete plan for how they will inform society about the importance of their work. We make it easy for them to reach a wide audience.

**Distance Learning**
The Masters of Natural Science Education degree serves science teachers globally. A key piece of this exciting program is that every course includes a hands-on lab component. We work with faculty on the design of these labs. We also assemble and ship the kits.

**National Parks**
Since 2012, we have been collaborating with the National Park Service on the design of hands-on STEM kits for schools that surround National Parks in Hawai‘i and Alaska.

**Foundations & Donors**
We have developed kits with specific grants from foundations and gifts from private donors. We are always seeking new partnerships to support our kit lending program.
“I had so much fun and not only that, I got to experience what it feels like to be a college student. I got to do the workshop on my own instead of having teachers walk us through everything. Thank you for everything!”
— S.G., 8th grade student from Timberline PK-8 School, Longmont, CO
Focus 3 STEM Kit Lending Library

Kits are packaged to be used individually or by pairs of students and are easy to transport. Teachers and informal educators can check out a classroom set of 15 kits for a week at a time. Because the kits are largely self-guided, students can work at their own pace and teachers are freed up to help the students who are struggling or suggest extensions for kids who want more.

Biology
Small Fish - Big Questions
Hominid Skulls
Secrets of the Hibernators
Scrub Jay Beaks *(coming soon)*

Chemistry
Get Energized!
High-Tech Rocks!
Dissolved Salts *(coming soon)*
Chemometers *(coming soon)*

Computer Sciences
Pico Pong

Earth & Environmental Sciences
Anchialine Pools
Vital Ice
Really Ancient Fossils
Soil Carbon
Plankton to Plastic Pollution

Engineering
Solar Cars

Mathematics
Optimization *(coming soon)*

Physics
Get Critical!
Regenrate
“You have influenced my students directly through STEM Fridays, you have helped me maintain my enthusiasm as a teacher through seminars, and you have opened conversations with teachers and given us tools for teaching controversial topics such as fracking and evolution. You provide continuing education for me in a manner that is not readily available elsewhere.”

— Vicky Jordan, Retired Science Teacher, Wellington Middle School
Focus 4 Mentoring

Pre-Service Teachers
Our center offers opportunities for enthusiastic CSU students to see how effective hands-on teaching methods can be.

• The approximately 55 students in the Bachelors of Science in Natural Science Education major are advised through our center.

• Our center is the home of the STEM Educators Club, where we offer space to study, coffee and snacks, trips to conferences, and opportunities to connect with schools and teachers.

In-Service Teachers
The best teachers are life-long learners themselves. We offer a selection of opportunities for teachers to reinvigorate their passion for teaching.

• STEM Fridays allow us to show teachers in real-time what elements are needed to create successful hands-on STEM lessons for their students.

• A variety of Professional Development Workshops and Lectures provide networking opportunities and support for topics that are difficult to teach (e.g. data analysis).

Under-Represented in STEM Fields
All of our programs strive to encourage young women and minority students to consider a STEM career. Two programs in particular include their success as the primary goal.

• SciTrek and SummerVet are summer camps that attract mostly female students from across the nation.

• The weekly after-school Triunfo Mentoring Program pairs first-generation college students with mostly Hispanic youth for homework help and STEM activities, in partnership with El Centro.
Triunfo Mentoring Program
Each pin represents a student or teacher who has participated in one of our programs or who uses our materials.
“The students were completely engaged. They love trial and error learning and this was perfect! They were learning from their mistakes and making minor adjustments and seeing instant changes. It was great!”
– Jayme Sneider, Westview Middle School, Longmont
The EOC staff is supported by the College of Natural Sciences and constitutes 0.5% of the college’s annual resident instruction budget. Additional funds are derived from participation in grants led primarily by college faculty at large and led by EOC staff from the National Park Service, Bohemian Foundation, and private individuals.

"As a teacher, I look forward every week to having the lessons of the week revisited and explained from a different point of view by college students. This is a tremendously valuable experience for these kids, especially because many of them have no family members who have had the college experience. My fourth graders get to actually sit in a college lab with college students just a few years older than they are and this makes the goal of attending college seem more attainable. Tutoring is the highlight of many of these kids' week.”

— César Fuentes, Teacher, Harris Bilingual Immersion School
Thanks to our Supporters!

For more information on supporting the EOC, please contact:
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