

Spring Expanding Your Horizons

motivating young women in science + mathematics

February 14, 2019

Santa Fe Convention Center
201 West Marcy Avenue, Santa Fe NM

Event Program





Student Schedule

7:30-9:00	Continental Breakfast
8:00-9:00	Registration
8:50-9:00	Welcome – <i>Sokhna Diouf, Los Alamos National Laboratory</i>
9:00-9:20	Team Activity
9:25-9:45	Group Photo
9:50-11:05	Workshop I
11:10-12:25	Workshop II
12:25-1:10	Lunch/Fair
1:15-1:35	Keynote Speaker – <i>Leah Buechley, Rural / Digital</i>
1:35-1:45	Keynote Speaker Q&A
1:45-2:00	Keynote Speaker Autographs
2:00-2:30	Raffle/Closing Remarks/Dismissal

Teacher/Sponsor Schedule

8:00-9:30	Registration/Speaker
9:30-10:30	Workshop I: Clues and Codes
10:30-11:30	Workshop II: Easy Household Chemistry
11:30-12:30	Workshop III: LilyPad
12:30-2:00	Lunch/Raffle/Fair
2:00-2:30	Closing Remarks / Raffle

2019 Workshop Descriptions

KEYNOTE SPEAKER

Leah Buechley, Rural / Digital

Leah Buechley is a designer, engineer, and educator. Her work explores integrations of computing, electronics, and design. She has done foundational work in paper and fabric-based computing. Her inventions include the LilyPad Arduino, a construction kit for sew-able electronics. She currently runs a design firm, Rural / Digital, that explores playful integrations of technology and design. Previously, she was an associate professor at the MIT Media Lab, where she founded and directed the High-Low Tech group. Her research was the recipient of an NSF CAREER Award and the 2017 Edith Ackerman award for Interaction Design and Children. Her work has been exhibited internationally in venues including the Exploratorium, the Victoria and Albert Museum, and Ars Electronica and has been featured in publications including The New York Times, Boston Globe, and Wired. Leah received a PhD in computer science from the University of Colorado at Boulder and a BA in physics from Skidmore College.

STUDENT WORKSHOPS

“Cryptography: How well can you keep a secret?”

Presenter: Lissa Moore

Co-Presenter: Alexandra DeLucia

Room: Peralta

Can you solve a mystery in 90 minutes? Something strange is going on around here... but there are clues hiding around. Unfortunately, the clues seem to be written in some kind of code. Learn how to crack the codes and solve the mystery! You'll also learn to design your own codes and write secret messages of your own. Sending messages and information so that only the right people can understand them is important in computer science, but it turns out you can send your secrets, even pictures and sounds, safely and securely without using a computer, and people have been doing just that for thousands of years.

Lissa Moore is a machine learning researcher at Los Alamos National Laboratory in the High Performance Computing Design group and the Ultrascale Systems Research Center. Lissa leads LANL's research efforts at the intersection of machine learning and high performance computing problems, including developing novel machine learning models for memory fault characterization, environmental sensor monitoring, and anomaly detection across the data center. Lissa's more theoretical work focuses on explainable machine learning.

“Bounce, Splat, and Stretch”

Presenter: Katie Brown

Co-Presenter: Suzanne Sheehe

Room: Sweeney D

Polymers are everywhere! Both natural and synthetic, polymers are a major part of our lives, from the food we eat to the clothes we wear, and from hairspray to space shuttles. We will explore some of the properties of these bendy and stretchy molecules by making bouncy balls that you can take home!

Katie Brown is a scientist at Los Alamos National Laboratory. Her degree is in chemistry and she researches small-scale shock dynamics in explosives using lasers. She is originally from Minnesota and has two dogs.

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“Why don't we look just like our parents?”

Presenter: Jessica Kubicek-Sutherland

Room: Ohkay Owingeh

In this workshop we will attempt to answer the question, "Why don't we look just like our parents?" In this hands-on activity, students will be given a bag of jelly beans that represent genes for several human traits. Then, working in pairs, students randomly choose new pairs of jelly beans from those corresponding to their own genotypes. The new pairs are placed on toothpicks to represent the chromosomes of the pair's offspring, building a DNA double-helix model. Then they will draw a picture of their offspring based on the genetic code provided. Finally, students compare genotypes and phenotypes of parents and offspring for all the "couples" in the class. In particular, they look for cases in which parents and offspring share the exact same genotype and/or phenotype, and consider how the results would differ if they repeated the simulation using more traits.

Jessica Kubicek-Sutherland is a staff scientist at Los Alamos National Laboratory in the Chemistry Division. She has a PhD in biochemistry and molecular biology. Her current research focus is on developing better ways to prevent, treat and diagnose infectious diseases.

“Why are plants so thirsty?”

Presenter: Danielle Ulrich

Room: DeVargas

How many cups of water do plants drink per day? We will use a suite of demonstrations to learn how plants use water, why different plants use different amounts of water, and how that influences where plants live. Demonstrations include a balloon/bike pump demonstration and wood pieces to look at wood permeability and water transport, straw bundles, wood pieces with visible vessels, celery sticks taking up food colored water, using a portable infrared gas analyzer instrument to measure plant photosynthesis and water use on live juniper and pinyon branches, and cross-sections of a tree to look at tree-rings.

Danielle Ulrich is a Los Alamos National Laboratory scientist who studies plant physiology and how plants will respond to future climate change. She is a first-generation college graduate and would like to inspire others to pursue science-related fields. Danielle likes to mountain bike, ski, and run.

“Light, Color, and Sparkles”

Presenter: Laurie Waters

Room: Kearny

The girls will explore the wave nature of light by learning about the electromagnetic spectrum from infrared to visible to ultraviolet light. We will use prisms and diffraction gratings to separate white light into colors and light sticks to bring colors back together. Using laser pointers, we will examine light scattering, reflection and refraction through cloudy water and smoked acrylic object prisms. We will briefly look at fluorescent objects, and write with light on phosphorescent paper. We will also look at infrared light with a special camera that attaches to an iPhone. There will also be several experiments set up around the room such as the laser microscope, and a demonstration on why the sky is blue. Since we have more time, I'll set up the data acquisition system on my PC which will allow the girls to identify various gasses from their EM spectra. I'll also teach them how to make the various types of rainbows with a glass of water and a flashlight.

Laurie Waters got her PhD in Physics at the State University of New York at Stony Brook and worked as a nuclear physicist at Los Alamos National Laboratory for over 21 years. She retired from the lab in 2012, and now does consulting work for a firm called TechSource, Inc., for places

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like the Department of Homeland Security. She dreamt of becoming a scientist from a very early age, back when there were not any computers. She read as much as I could about science, and had friends with similar interests. She is especially interested in understanding the fundamental basics of modern physics, of which light is a very important part.

“Fun with Snap-Circuits”

Presenter: Heidi Morning

Room: Nambe

Snap-Circuits are kits that include basic circuit components and guide students through several engaging projects. Some of the projects that we have done in the past include FM radios and a variety of motion sensor circuits.

Heidi Morning received her bachelor's in Computer Engineering from California State University Bakersfield and her master's in Electrical and Computer Engineering from the University of California at Davis. She has practiced her trade through several internships at places like Lockheed Martin, Los Alamos National Laboratory, and small private industries. Currently, Heidi works at Los Alamos National Laboratory's Intelligence and Space Research division. There she seeks to create, deliver, support and exploit innovative sensing systems for space-based, airborne, and ground-based applications to address critical national security and scientific challenges

“For the Love of Science”

Presenter: Sheri Lopez

Room: Sweeney C

Fall in love with science while learning about all the fun critters that love to love you and our earth. Create argar art out of your own, diverse microbiome in a petri dish (we will initially make them, but the results will take a few days to appear. You can take this home!). See the beauty of biological reactions while exploring bio-luminescent algae. Make your own blue lamp and learn how these bio-luminescent organisms help marine life light up the dark ocean. Lastly, explore how bacteria help you digest food as we eat some sweet, sweet Valentine's Day goodies.

Sheri Lopez has loved science since her wee years as a tiny tot. She grew up in Pojoaque Valley, graduated from Pojoaque High School, then stumbled around early adulthood trying to figure out what she wanted to do. Luckily, science was always there for her, and she found her place in Mechanical Engineering and Mathematics. She now works for Sandia National Laboratory designing machines. She loves her job, and science, and hopes that this workshop will show you how amazing STEM can be!

“The Chemistry of Red Cabbage: A Homemade pH Indicator”

Presenter: Chelsea Neil

Room: O'Keeffe

In this workshop, I will present what pH is and its importance before demonstrating how red cabbage juice will change color when added to different household substances, such as vinegar, baking soda, lemon juice and soda, depending on their pH.

Chelsea Neil graduated with a Ph.D. in Energy, Environmental and Chemical Engineering in 2015 from Washington University in St. Louis, where she studied arsenic-bearing mineral dissolution and secondary mineral precipitation during aquifer recharge. After graduating, Chelsea spent two years at the U.S. EPA's National Risk Management Research Laboratory in Cincinnati, Ohio, working on the development and implementation of safe and sustainable aquifer recharge

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operations. Chelsea began my postdoc at Los Alamos National laboratory in May of 2018. Her current research focuses on the subsurface transport of fission products.

“Calling all Future Industrial Hygiene Heroes!”

Presenter: Dina Siegel

Room: Sweeney A1

Students will learn how Industrial Hygienists protect the health and safety of people where they work. These "invisible heroes" make sure our friends, acquaintances, and loved ones come home safe every day. Students will be able to use instruments that measure hazards associated with many jobs, and will solve an industrial hygiene mystery.

Dina Siegel, CIH, CSP, CBSP, FAIHA B.S. Environmental Health, Colorado State University, 1982. M.S. Mineral Resource Ecology (Environmental Science), Colorado School of Mines, 1992. Industrial Hygiene and Safety Professional IV, Chemical and Biological Safety Program Lead, Los Alamos National Laboratory

“Lightning and Thunderstorms in Virtual Reality”

Presenter: Michael Peterson

Room: Sweeney B

"When thunder roars, go indoors" is great advice for staying safe when there is lightning around. But what would it look like if you were in the heart of nature's fury? Or high above in the International Space Station? Find out in this Virtual Reality workshop.

Michael Peterson is currently a space and remote sensing scientist at Los Alamos National Laboratory, but previously worked with NOAA on their brand new geostationary GOES satellites - particularly its first-ever lightning detector. Dr. Peterson uses a combination of visible light observations and radio measurements to understand why lightning looks the way it does, and what flash appearance can tell us about lightning physics.

“All about birds: identification, aging, activities, and more!”

Presenter: Audrey A. Smith

Co-Presenter: Jenna Stanek

Room: Lamy

In this workshop, we will teach students the basics of identifying birds by sight and sound. They will learn different techniques scientists use to age birds and determine gender. Students will participate in hands on activities that will teach concepts of data collection for scientific studies.

Audrey Smith has an educational background in environmental studies. She has a BS in environmental science and an MS in environmental engineering. Audrey started at Los Alamos National Laboratory as a high school co-op student. During her BS degree she had the opportunity to work with the Biological Resources Program at LANL where she received experience in wildlife biology. Audrey worked as an environmental engineer for a short time after she graduated, but soon realized her passion was for wildlife.

“Plants and Climate”

Presenter: Sanna Sevanto

Room: Milagro

We will discuss and explore the ways plants influence climate, and measure plant water transport capacity on samples from different species.

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Sanna Sevanto is a research scientist at Los Alamos National Laboratory. She has a master's degree in material science and a PhD in applied physics from the University of Helsinki, Finland. Her interests in biomechanics and the environment have lead her to apply the knowledge of physics to studying plant physiology and plant responses to environmental stress. Before beginning her career at LANL in 2009 she spent three years studying plants at Harvard University and teaching atmospheric thermodynamics and fluid mechanics at the University of Helsinki. Her current research focuses on understanding how different environmental stresses kill trees and how plant structure affects their vulnerability to environmental stress. Being a former member of the Finnish ski-orienteeing team, Sanna is an active participant in all kinds of endurance sport from long distance running to triathlons, which she took up in Los Alamos. But outside science cross-country skiing and fine arts are the topics closest to her heart.

“Hand Ergonomics and Grip Strength Testing”

Presenter: Lori Lazaro

Room: Lobby

This is "hands-on" interactive session is designed for participants to learn about musculoskeletal disorders, hand injury prevention, and how repetition of the same hand motion can affect their hand grip strength. Students will perform a repetitive hand task, then measure their grip strength using a standard dynamometer.

Lori Lazaro is a first-generation college student that obtained her master's degree in Public Health - Occupational Safety & Health from Texas A&M University. Her passion for science and health began when she was 12 years old and dreamed of becoming a doctor to help the injured. Today, Lori works daily in the identification and mitigation of ergonomic risk factors, which could potentially place individuals at risk for injury at Los Alamos National Laboratory. Lori works to ensure that your working environment is always a safe, efficient, and a comfortable place.

TEACHER WORKSHOPS

“Workshop I: Clues and Codes”

Presenter: ¡Explora! – Anthony Salvagno & Hali Willis

Room: Coronado

They are all around us. Discover sequences and patterns in everyday objects, part of your body, math, and chemical reactions. What logic will you apply to figure out the code?

“Workshop II: Easy Household Chemistry Experiments”

Presenter: Genna Waldvogel

Room: Coronado

This workshop will provide lesson plans, strategies, laboratory procedures and material list to get you started with easy chemistry experiments and demonstrations for all levels. Topics include chemical reactions, hydrogen-bonding, molarity, measurement and the scientific method.

Genna Waldvogel is a civil engineer at Los Alamos National Laboratory. She works for the utilities and institutional facilities division and works for the Smart Lab Team, creating more energy efficient laboratories. Genna has a BS in Environmental Science from University of Vermont and a MS in Civil and Environmental Engineering from Carnegie Mellon University. After finishing her bachelor's degree, Genna joined Teach for America and was a high school Chemistry and Environmental Science teacher for four years at Hartford Public High School in Hartford, CT. She loves science and creating an environment in the classroom that will draw students in!

2019 Workshop Descriptions

“Workshop III: LilyPad”

Presenter: Sandy Frost

Co-Presenter: Veronica Camarillo-Morris

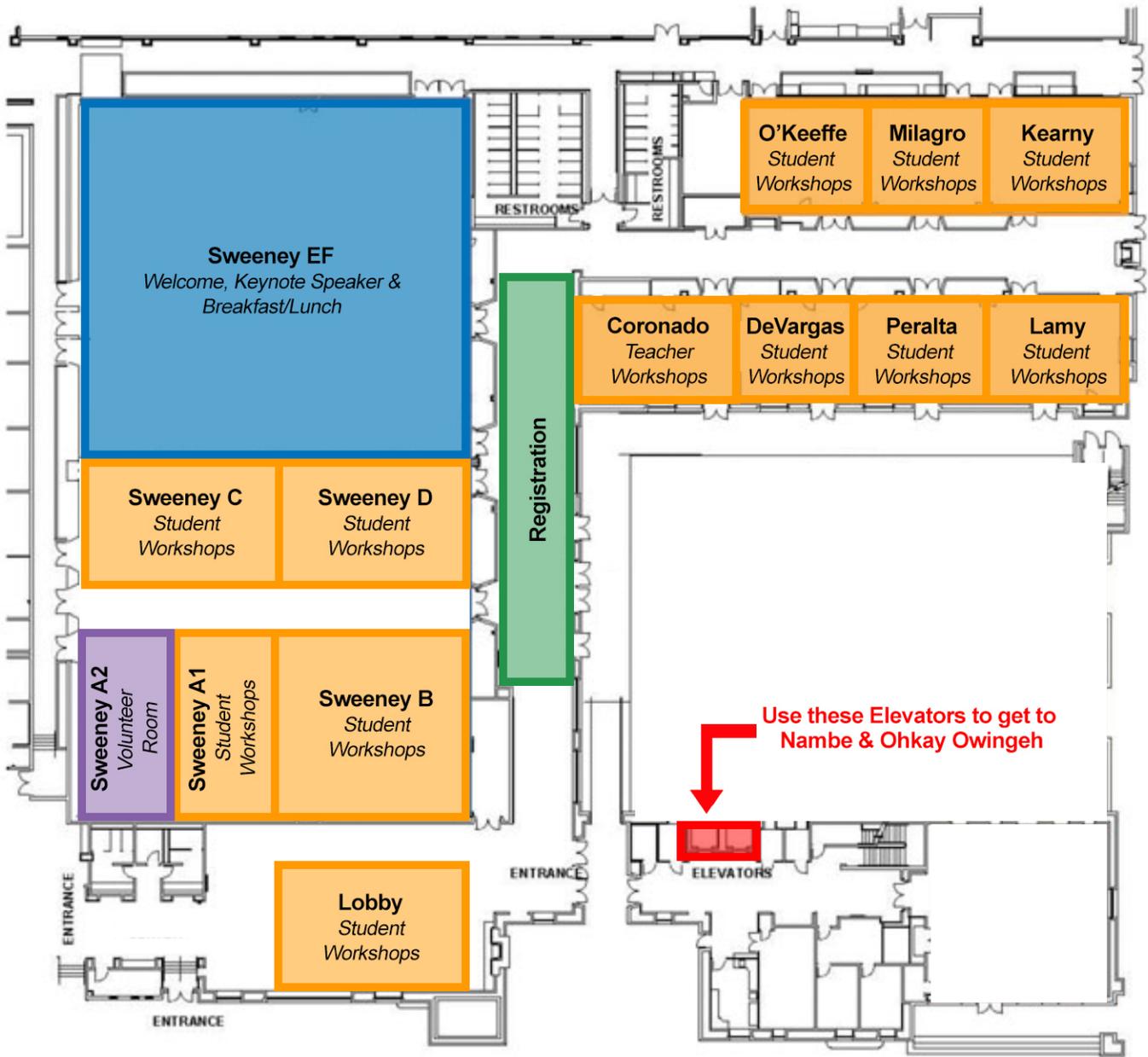
Room: Coronado

The LilyPad is a microcontroller designed to be integrated into e-textiles and wearable projects. This workshop will cover the basics of circuits and programming and will include a hands-on project. No experience with hardware or software is expected.

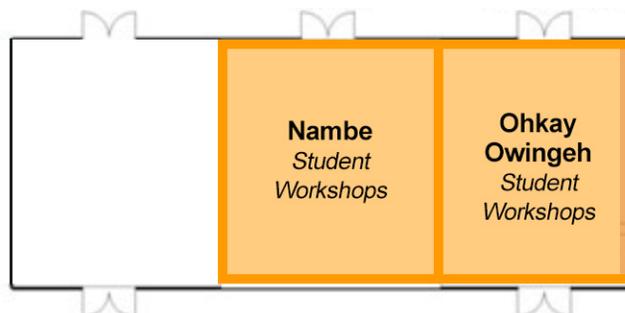
Sandy Frost is an electrical and computer engineer who works as a solutions architect, developer and certified security specialist at Los Alamos National Laboratory. She was inspired by her Grandfather’s love of learning and hopes to light the fire for others.

Veronica Camarillo-Morris is a proponent of technology for the betterment of humanity. Her professional background is in the integration and implementation of technology for operational efficiency and innovation. Veronica’s master’s is in Network Communication engineering with an emphasis in Software Defined Networking. She is most passionate about Amateur Radio, and organizations that promote STEM as well as our young women in pursuit of technical careers.

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