



8:00-9:00 Registration

Student Schedule

9:00-9:20	Welcome- Jill Tietjen
9:30-11:00	Workshop 1
11:00-12:30	Lunch / Fair / Speaker
12:30-2:00	Workshop 2
2:00-2:30	Closing Remarks / Raffle

Teacher/Sponsor Schedule

9:00-9:00	Jill Tietjen- Student Welcome
9:00-10:30	Jill Tietjen- Teacher Discussions: <ul style="list-style-type: none"> • What is Engineering? • How to introduce this topic to students. • How to engage/encourage students in Engineering and STEM projects.
10:30-11:30	Bosque Ecosystem Monitoring Workshop
11:30-12:30	Lunch / Fair /Speaker
12:30-2:00	Bosque Ecosystem Monitoring Workshop
2:00-2:30	Closing Remarks / Raffle

2016 Workshop Descriptions and Presenter Biographies

KEYNOTE SPEAKER – Jill Tietjen

Jill S. Tietjen, P.E., is an author, speaker, and electrical engineer. Her published books include the Setting the Record Straight series, which explores the history of women's accomplishments in accounting, engineering, and professional achievement, and an introduction to engineering textbook (for use by college freshmen), Keys to Engineering Success. She is one of the top historians in the country on scientific and technical women. She is the CEO of Technically Speaking, a national consulting company specializing in improving opportunities for women and girls to have more career options in technology.

Tietjen is also a frequent keynote speaker at engineering, science, and women's conferences and is often profiled in the media. She serves as an expert witness before public utility commissions and other government agencies. The culmination of Tietjen's diverse background is the bestselling book *Her Story: A Timeline of the Women Who Changed America* (Collins), co-authored with Charlotte S. Waisman, for which they received the 2012 Daughters of the American Revolution History Award Medal.

Tietjen regularly speaks on women in engineering, historical women in engineering and science, and leadership topics. Her positive energy and her ability to relate to the audience result in inspired and energized listeners.

Tietjen has written articles for and been profiled in SWE: Magazine of the Society of Women Engineers, Graduating Engineer, U.S. Woman Engineer, Woman Engineer, and Engineering Horizons. She served as the 1991-1992 National President of the Society of Women Engineers (SWE). As Jill S. Baylor, she is a contributing author to the 1995 book *She Does Math!* She serves on a number of non-profit boards. In addition, she is a member of the Board of Directors for the Georgia Transmission Corporation of Tucker, Georgia and Vice Chair of the Board of Directors for Merrick & Company of Aurora, Colorado. She is a Fellow Life Member of SWE and a Senior Member of the IEEE Power Engineering Society. She has been inducted into the Colorado Women's Hall of Fame. Tietjen is listed in *Who's Who in Engineering*, *Who's Who in Science and Engineering*, and *Who's Who in Technology*.

TEACHER WORKSHOP

"Rio Grande Ecosystem"

Susan Coulter, Ecology

Room: Coronado

The workshop this year will include a Rio Grande Nature Center presentation developed for teachers that provides guidelines and materials focused on educating children about the Rio Grande ecosystem. The Bosque Education Guide is an interdisciplinary curriculum about the Middle Rio Grande Valley ecosystem. The curriculum provides classroom-based and field activities for students grades K-12. For the central activity, students construct a model of the Middle Rio Grande and then manipulate the paper and cloth pieces to demonstrate human impacts over the last two hundred years. Later, they "restore" the ecosystem.

Susan grew up in southern Illinois and received her Bachelor of Science in Computer Science in 1985 from Missouri Science & Technology. In 1992 she started working at LANL and has held several different positions there. In 2005 she joined HPC Division as a Compute Cluster System Administrator. From there her focus moved to the high speed interconnects required for these large compute clusters to function at the incredibly fast bandwidth required. Her interests include being a trained docent at the Albuquerque BioPark Zoo and all aspects of the natural world.

STUDENT WORKSHOPS

“Electro-Magnetic Motor”

Divya Banesh, Roxana Bujack, Anne Berres/Electricity and Electro-Magnetism

Room: Ballroom C2

In this workshop, we will learn more about electricity and electro-magnetism. We will use a battery and some copper wire to make an electro-magnet. Then we attach another spool of wire to the system and watch it spin!

Divya Banesh is a graduate student at University of California, Davis, earning her PhD in computer graphics and visualization. In collaboration with Los Alamos National Lab, she works on analyzing large data on super computers and creating images showing different global phenomena. They study these images to determine trends in climate change, movements of asteroids and effects of earthquakes.

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

Lissa Baseman, Computer Science

Room: Okhay Owingeh

Can you solve a mystery in 90 minutes? Something strange is going on around here... but there are clues lying 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 secret codes and write secret messages of your own. Sending messages and information so that only the right people can understand them is very 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 Baseman is an applied machine learning researcher at Los Alamos National Laboratory. She uncovers patterns and knowledge hidden in data coming off of the lab's supercomputers. She has also worked at MIT Lincoln Laboratory, studying social networks (including Twitter), financial fraud, and computational social science. Lissa has a Masters degree in machine learning from the University of Massachusetts Amherst, and a B.A. in computer science from Amherst College. Lissa also plays flute and piccolo, and enjoys camping, hiking, cooking, and walking dogs at the animal shelter.

“Follow the bouncing ball...into the FUTURE”

Jessica Baumgaertel & Katie Brown, Polymers

Room: Ballroom D1

Bendy and stretchy materials are everywhere, from our bodies to space shuttles! We will introduce a class of molecules called *polymers* and explore how chemistry at the molecular level leads to elastic materials with properties that we can literally play with. We'll make some *super bouncy balls* that you can take home. We'll learn about different types of energy, and how storing energy and releasing energy makes the balls bounce so high, using the new bouncy balls you made to do some experiments!

Jessica Baumgaertel and Katie Brown are researchers at Los Alamos National Laboratory. Katie is a chemist who shoots lasers at high explosives, and Jessica is a physicist who runs computer simulations of giant lasers that make fusion energy. Katie is from Minnesota and Jessica is from Washington and both love living in New Mexico now. Katie has two giant fluffy dogs, and Jessica has two large fluffy cats and a guinea pig.

“Exploring Groundwater in New Mexico”

Michelle Bourret, Hydrology

Room: Ballroom C1

This workshop looks at groundwater – how it ends up in the ground, how it moves, and how we use it for our water supply. We'll also look at how contaminants can spread in groundwater and the detective work required to track down their sources.

Michelle Bourret is a groundwater hydrologist and modeler at Los Alamos National Laboratory. She has her B.S. in Earth Sciences from UC Santa Cruz and M.S. in Hydrology from New Mexico Tech, and has also worked in water chemistry science at the US Geological Survey in Boulder, CO. She loves living in New Mexico, especially enjoying the hiking, skiing, running trails, and, of course, the chile.

"Robots!"**Cheryl Brabec, Robotics/Engineering****Room: O'Keeffe**

Explore the world of robotics and how they interact with their environment. Participants will get to create their own robotic devices.

Cheryl Brabec is a current PhD student at Los Alamos National Laboratory with the University of Texas. She studies Robotics and Nuclear Engineering, and hopes to get more robots involved with dangerous tasks.

"Fluids in Action"**Sarah Burnett & Shane Coffing, Fluid dynamics and thermodynamics experiments****Room: Milagro**

Experience the variety of properties and weirdness that is encompassed by the studies of fluid dynamics. Learn about turbulence, laminar flow, and changes in viscosity that you see everyday. Discover the limitless attributes of fluids and the expansive applications. Innovative technology has brought us at the forefront of making mathematical models and simulations close to the experiments you will see here. The beauty of fluids is compounded only by its mystery.

Sarah Burnett graduated undergraduate from UNC last year with a degree in Applied Math and Physics. During her undergraduate she got highest honors for a thesis on the Taylor pipe flow experiment and did summer research on particle-laden flow on an incline at UCLA. She now works at LANL studying compressible flow.

"Computer Science-Hour of Code"**Laura Davey, Computer Science****Room: Pojoaque**

Let's use code to join Anna and Elsa as they explore the magic and beauty of ice. You will create snowflakes and patterns as you ice-skate and make a winter wonderland that you can then share with your friends! Girls will "pair program" their way through the Hour of Code "Frozen" tutorial and program with Angry Birds. <http://code.org>

Laura Davey is a computer scientist at Los Alamos National Laboratory. She works on the design and implementation of the software which monitors the health of LANL's super computers and their networks and facilities.

"Nitrogen"**Melinda DeHerrera, Gases****Room: De Vargas**

I will present a slideshow on what Nitrogen is, consists of, is used for, benefits, and safety factors. I will then do a demo that consists of freezing an object (or something of the sort) and will then taper off with creating nitrogen ice cream.

Melinda De Herrera received a BA in Engineering IT in December 2015. She continues to pursue a higher education at NNMC with a post-bachelor certificate and loves being a minority engineer. She works part-time at LANL for the OS-PT Gas Facility department and loves it!

"Birds of a Feather: STEM Takes Flight"**Tatiana Espinoza, Emily M. Phillips, & Maria Musgrave, Bird Banding****Room: Ballroom B2**

Wildlife students from Los Alamos National Laboratory demonstrate their field work with birds. Birds are a key resource to determine environmental conditions from sited in their migratory patterns. Through hands-on activities, participants will learn the basic skills used in Avian Biology.

Tatiana Espinosa was born in Ecuador and moved to the US in 2008. She earned her bachelor's degree in Environmental Science from the University of New Mexico. She started working for LANL in 2013 and in April 2015 got transferred to the ENV-ES group where she assisted the Biology team to do bird work. She is currently pursuing her Master's degree in Natural Resources Stewardship through Colorado State University. *Emily Phillips* has been interested in all areas of STEM since elementary school, and has continued to pursue those areas as she has grown and continued her schooling. She is a recent graduate of New Mexico State University with a B.S. in Conservation Ecology. She is currently working at the Los Alamos

National Labs before going back to pursue a graduate degree with an emphasis on birds of prey. *Maria Musgrave* grew up in Los Alamos, NM with a love for the outdoors and all wildlife. She completed a degree in Environmental Science from the University of Redlands in California, but missed the mountains and canyons of Northern New Mexico. Since returning to Los Alamos, her interest in the natural environment and its conservation has only grown, and she hopes to share that interest with others!

"Sink or Float"

Sarah C. Hernandez, Density

Room: Ballroom B1

The students will explore the concept density by using various different liquids and objects.

Sarah is a native Texan and received her PhD in physics at the University of Texas at Arlington. She is currently a postdoctoral fellow at Los Alamos National Laboratory.

"Cashing in with Personal Finance"

Sharon Hurley, Accounting

Room: Tesuque

Students will learn about careers in the finance and accounting industry and will participate in practical demonstrations about money and finance. We will look at lunch savings (we look at the price of purchased/fast food lunch versus taking own), college costs and saving now for college. We will look at the cost of an item charged on a credit card and see how the costs increase with interest.

Sharon has PhD in Accounting with a minor in economics from Texas A&M University; Masters in Accountancy from University of North Florida; BS from Brigham Young University; Department Chair of Business, Computer Science and Information Technology at UNM Los Alamos; Assistant professor of Business UNM Los Alamos; Certified Public Accountant, licensed in New Mexico and Colorado; Owner of Accounting and Tax Services of Northern New Mexico.

"Crystal Craziiness"

Elaine Jacobs, Geology

Room: Ballroom D2

Do you love crystals? Have you wondered about the processes that control their form and color? This workshop is designed to explore the wonderful world of crystalline minerals. We will make origami models, explore crystal symmetry, see what they look like under the microscope, explore their use as an art media, and grow our own crystals. If you are intrigued by the dazzling world of crystals, this is the workshop for you!

Elaine grew up in New Mexico and has always loved being out and about exploring the local landscape. Early on, she couldn't decide if she wanted to be an archeologist or a geologist. In high school she volunteered for the National Forest Service and made maps of Ancestral Puebloan sites. During this time Elaine received a grant to study Native American game traps. This was her first research project! She went on to attend Carleton College in Minnesota and Duke University in North Carolina. Her interests gravitated toward geology at these schools where she was able to learn about fossils, ancient rocks of the Canadian Shield, and the beautiful metamorphic minerals found in the Appalachian Mountains. After college, she worked for the National Park Service at various locations including Glacier National Park, Rocky Mountain National Park, and Bandelier National Monument. Elaine has a master's degree in Geology from Colorado State University. She has made several paleotopographic maps that show the landscape southeast of the Valles caldera before and between eruptions that initiated around 1.6 million years ago. She came to Los Alamos National Laboratory in 2007 as a Graduate Research Assistant and is now a Research Technologist in the Earth and Environmental Sciences Division.

"How do you unscramble an egg"

Jessi Just, Recycling

Room: Ballroom A1

A system called "single stream" has replaced sorted recycling in many municipalities around the country, including Santa Fe. But what happens to all those plastic, paper, glass and metal items once they are "scrambled" in the bin? Single-stream recycling ends up at a place called a materials recovery facility, or MRF, where the unscrambling begins. Today, workshop participants will learn about recycling by becoming the machines that unscramble the materials!

Jessi Just is the Deputy Director for New Mexico Recycling Coalition. She possesses unending energy for recycling advocacy and “talking trash”. Her past escapades include living & working on a river trash barge, inspiring volunteers to help clean up the Missouri River, organizing recycled fashion shows, and operating heavy equipment at a transfer station. She has come to speak with us today about the variety of jobs in the recycling industry and to inspire you to jump on board!

“Magical Mechanisms”

Sheri Lopez, Physics/Mechanical Engineering

Room: Peralta

The girls will build and design an airplane, or a guillotine (whole group choice) in small groups. We will then have a competition to see which groups can fly further, or launch an object further. The object is to learn and appreciate sturdy mechanical design, and how to work well with others.

Sheri Lopez is currently a sophomore at New Mexico Tech majoring in Mechanical Engineering, and minoring in Aerospace Engineering. When she grows up, she wants to be a rocket scientist!

“Electricity and Magnetism in our lives: from the magnetic field of the Earth to electrical motors”

Priscilla F. S. Rosa, Electricity and Magnetism

Room: Lamy

Electricity and magnetism are everywhere. The Earth generates a magnetic field that we are all subject to. Electrical currents illuminate the light bulbs in our homes. Fans, blenders, and washing machines are a few examples of applications containing electrical motors. In this workshop, we will understand how this stuff works! We will build a compass that will point to the magnetic north pole of Earth. We will also build a simple electrical motor using an AA battery. By the end of the workshop, I will show that certain materials, called superconductors, can float on top of a magnet due to their ability of expelling magnetic fields.

Priscilla received her bachelor’s degree in Physics in 2008 and PhD in Physics in 2013. Since then, she has performed research on the rich interplay between superconductivity and magnetism.

“Video Games for Scientific Problem Solving”

Kari Sentz and Elise Elfman, Computer Science/Math

Room: Nambe

Ever hear that video games are a waste of time? Video games can be a fun and highly effective way to educate and even solve hard problems. This workshop explores using video games to teach, communicate, and solve wickedly difficult scientific problems. Come prepared to play!

Kari Sentz became a scientist for the opportunity to play around with cool ideas from machine learning and artificial intelligence. It comes as no surprise that this led to gaming and game technology as a means of education, communication, crowdsourcing, and scientific problem solving. Working in game technology Kari to meet her co-presenter, *Elise Elfman*, who is a technical artist and game creator.

“Light, Color, and Sparkles”

Laurie Waters, Light Spectra

Room: Kearny

The girls will explore the electromagnetic spectrum from infrared to visible to ultraviolet light. We will use prisms and diffraction gratings to separate white light into rainbows and light sticks to bring colors back together. We will examine the reflection and refraction of laser pointer light made visible through cloudy water and smoked acrylic prisms. We will learn how to turn a laser pointer into a microscope. We will also use UV light to examine fluorescent objects, and write with light on phosphorescent paper. Other demonstrations will introduce index of refraction, and look at why the sky is blue during the day and red in the evening. The girls will also learn about the safe use of laser pointers and UV light.

Laurie Waters is a nuclear physicist specializing primarily in radiation transport computer simulations. She worked at Los Alamos National Lab for 21 years, retiring from the lab in 2012. She now does contract work for several customers in the same field.



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