

Volume 7, Issue 1

www.sonoma.edu/scitech

October 25, 2017

Our hearts and thoughts are with all those affected by the recent Northern California wildfires. Words cannot express how thankful we are for the first responders and all emergency services personnel who came to our aid from near and far. #NomaCares

Dean's Message – Dancing with Change

Greetings!

Welcome to the Fall 2017 issue of our Science & Technology (SST) Newsletter. It's been an exciting year since we began "Dancing with Change" in partnership with our new President, Dr. Judy Sakaki and newly appointed Executive Vice President and Provost Lisa Vollendorf.

In this issue, we share stories about some of the many steps we are taking in this dance to advance our SST school mission of educating the future change-makers in the areas of science, technology, engineering and health. Our 5th Annual Science Symposium showcasing student research and scholarship reached new heights of participation and is evidence of our deepening culture of capstone learning, research and independent inquiry for our students. You'll read about some of these projects and the inspirational students and faculty who worked on them in this issue.

In September, President Sakaki was there with the scissors to cut the ribbon in celebration of the grand re-opening of our 40+ year-old campus observatory. Her remarks highlighted the observatory's role in the community, "I believe ambition and wisdom make powerful partners, and our observatory fosters both of them. Thanks to this wonderful resource, we reach for the stars through our research and teaching, and we reach hearts through public engagement."

This fall the SSU Makerspace is opening with seed funding from the National Science Foundation. Already the buzz about this new resource and its support of the "dream, make and innovate" approach is dancing its way across the School, campus and beyond.

My role in hiring new faculty and staff is one of my greatest joys as Dean. These high-achieving and dedicated educators elevate everything we do to new levels. This year six new permanent faculty are kicking off their classes and building their research agendas to engage our students. Don't miss reading about these new faculty members in this issue.

In August, we gazed at the cloud-covered sky hoping to see partial solar eclipse as it passed over the Green Music Center. Many of our colleagues traveled north to be in the path of totality and returned to share their enchanted experiences under the darkened daytime sky. This awe of discovery is a core part of education and research in Science & Technology at SSU.

I hope you enjoy reading this issue, and if you have any comments, I would love to hear from you.

Sincerely,

Lynn Stauffer, Dean
School of Science & Technology



Dr. Natalie Hobson

Assistant Professor Natalie Hobson joins the Department of Mathematics and Statistics. She received her Ph.D. in Mathematics and her M.A. in Mathematics Education from the University of Georgia. Her research interests include algebraic geometry and students' thinking and reasoning in undergraduate mathematics. When not doing math, she enjoys cycling, swing dancing, sewing and yoga.



Dr. Anamary Leal

Assistant Professor Anamary Leal is the latest addition to the Department of Computer Science. She earned her Ph.D. from Virginia Tech. Her research is in human-computer interaction; she also studies how to design technologies to help people craft, build and make. She enjoys building and crafting of many sorts, including award-winning costumes.



Dr. Mohamed Salem

Assistant Professor Mohamed Salem joins the Department of Engineering Science. His Ph.D. is Electrical Engineering from the New Jersey Institute of Technology. He was a postdoctoral fellow at Polytech Montreal, Canada. He then held a lecturer position at University of Idaho. His research is in electromagnetic waves propagation and scattering antennas, and RF and microwave devices.



Dr. Sudhir Shrestha

Assistant Professor Sudhir Shrestha also joins the Department of Engineering Science. He received his Ph.D. in Engineering from Louisiana Tech. He was a postdoc assistant research professor at IUPUI, then a visiting assistant professor at Miami University, Ohio. His research is in smart sensing systems, non-invasive disease detection/health-monitoring, and microelectronic devices; he is interested in STEM outreach. His wife Ranjana is a dental hygienist and is also originally from Nepal. They have a beautiful 10-month-old daughter Shophie. He loves hiking, camping, and outdoor activities.

New Faces



Dr. Laura Waters

Assistant Professor Laura Waters is the latest addition to the Department of Geology. Her Ph.D. is in Geology from the University of Michigan. She was a postdoctoral fellow at the Smithsonian Institution before coming to SSU. Her research focuses on the origin of the continental crust and the factors that control magma eruptions on the Earth's surface. She loves being on the marsh in Virginia with her brothers, spending time in the Sierras with her husband and generally enjoying anything that takes her outside – trying to maximize smiles per mile.



Dr. Karen Werder

Assistant Professor Karen Werder joins the Department of Nursing. She received her Ph.D. in Psychology and M.S. in Nursing from UCSF. She was a psychiatric nurse practitioner in the Sonoma County behavioral health system for 20 years before joining SSU. Her research interests include the effect of marijuana use on adolescent mental health, resistance to forgiveness, and stigma associated with psychiatric nursing clinical rotations. She loves spending time with family including her granddaughter. She enjoys gardening, painting, swimming, hiking and traveling.

New Spaces

The School of Science and Technology's Student Success Center opened this fall. The space serves as a hub for MESA and facilitates tutoring, mentoring and advising for SST students. SST will be hiring a Student Success and MESA Coordinator; this person will spearhead the MESA program at SSU in addition to creating a robust tutoring, advising and mentoring program for SST students.

In the meantime, MESA is providing free drop-in tutoring for SST students for Math 161, Math 211, CHEM 115A, and CHEM 115B. The schedule is available here: mesa.sonoma.edu/tutoring.html.

The Student Success Center is located in Darwin 100A, which is in the north-west corner of the Darwin Lobby.



SST Leads Efforts to Create SSU Makerspace



The SSU Makerspace had its opening inauguration on October 4. Techies, hobbyist, do-it-yourselfers, crafters, and gamers found two thousand square feet of paradise waiting for them. Housed in the Library, the SSU Makerspace serves as a campus melting pot and a digital fabrication center. Laser Cutters, CNC-mills, 3D printers, VR systems, vinyl cutters, 3D scanners, sewing machines, digital embroidery stations, a circuit board printer, and a sublimation printer are just some of the instruments available. The SSU Makerspace merges traditional arts and crafts with modern empowering digital technology. For the Fall 2017 semester, the Makerspace will have open hours from noon-5 pm, Monday through Friday. These operational hours will expand in subsequent semesters. In addition to open hours for the campus, the space supports academic efforts such as the maker course, Science 220: Dream, Make, and Innovate, and the Maker Certificate Program for Educators.

For the last three years, Professor Jeremy Qualls from the Department of Physics and Astronomy has been working on a vision to create a shared campus makerspace available to all students, faculty, and staff regardless of major or background. Students needed a casual place to develop technical skills and faculty needed resources to develop classroom and

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SSU OBSERVATORY REMODEL

Sonoma State University has a new home to view the cosmos. After first opening 41 years ago, the Sonoma State Observatory officially reopened with a ribbon cutting ceremony and public viewing night September 8, 2017. A crowd of between 250 and 300 gathered to hear the remarks of President Judy K. Sakaki, Provost Lisa Vollendorf, Dean Lynn Stauffer and Physics and Astronomy Professor Scott Severson. Once the ribbon was cut, the observatory roof rolled open and the new facility was opened to the public. Despite the clouds rolling in, the crowd enjoyed the evening of photos, cocoa, cookies, a tour of the facility, music and good conversation! There was even an inflatable planetarium set up on the nearby track, generously provided by Physics & Astronomy Chair Lynn Cominsky's Education and Public Outreach group.



The new Observatory shown with roof open at twilight. The orange 14-inch telescope is visible.
Photo by Scott Severson.



Upgrades to the facility include a brand new building with a powered slide-off roof, updated computers and digital presentation tools to complement what is viewable through the telescopes. The observatory contains two main, pier-mounted telescopes with computer control, as well as other small telescopes for use outside on

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research efforts. Supported by major funding from the National Science Foundation to enhance STEM education and a strong partnership with the Library, that vision is finally coming to fruition. Student technicians will staff the SSU Makerspace with help from a part-time technician and technical expertise from SST faculty. The Director of Library Technology, Jonathan Smith, will manage the space and insure smooth integration into the Library infrastructure and mission.



SCI 220 students using the Makerspace.



Physics & Astronomy Department checking out new 60-watt laser cutter.

The SSU Makerspace will continue to evolve and grow, providing new resources to SSU and the community. It is part of a larger Make@SSU initiative to increase innovation and experiential learning. Future efforts include collaborating with other Schools across campus, local makerspaces, and eventually with other campuses in the CSU system. For more information, please contact Dr. Jeremy Qualls at quallsj@sonoma.edu. The SSU Makerspace also welcomes donations of unwanted arts and crafts supplies and board games. —Dr. Jeremy Qualls



Interested in motivating and inspiring your students at SSU's beautiful Galbreath Wildlands Preserve?

New Madrone Camp and a 1.5-mile trail is available for classes, research, and other inquiry!

Facilities include water, picnic tables, food storage, and portable toilet. Madrone Camp can host 30-40 people and is ADA accessible. Windy Pass Trail starts at the campground, follows an old logging road along ridge-lines under hardwood forests and culminates with spectacular 360-degree view of the Mendocino landscape. Two preserve vehicles, each seating 5-6 people are available for travel to the preserve free-of-charge. To make a reservation for your class, research, or art project, go to www.sonoma.edu/cei/visit or contact Center Director Claudia Luke (707-664-3416 or 707-536-8915) for a tour.



NCCC Americorp crew member works on Madrone Camp picnic table. Students in the Center's land management training program, Preserve Stewards, the NCCC Americorps Silver Team, neighbors, other volunteers and contractors did an amazing job this summer. Many thanks to everyone for their enthusiasm and hard work.



Seating for 20 at Madrone Camp's elegant roundtable. Additional standard picnic tables visible and food storage container in background. Many thanks to Mark Rawlins (left) and the many other volunteers who made this table a reality.

(Continued from page 3)



Professors Targett and Severson, President Sakaki, Provost Vollendorf and Dean Stauffer at the Ribbon cutting ceremony. Photo courtesy of University Advancement.



The crowd in attendance at the ribbon cutting ceremony. Photo courtesy of University Advancement.



Observatory assistant and physics major Jacob Davidson describing the operation of the 11-inch telescope. Photo courtesy of University Advancement.

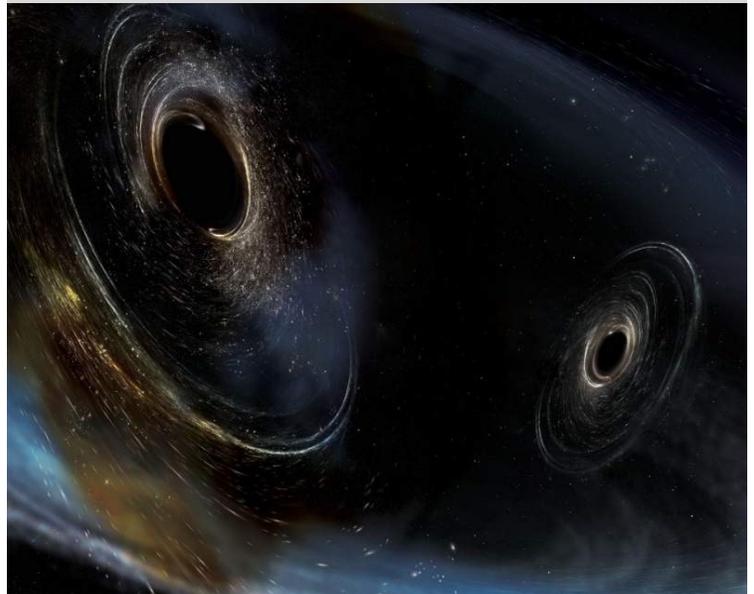
public viewing nights. The venerable 14-inch Schmidt-Cassegrain Celestron telescope rests on the east pier and is used for visual observing and spectroscopy. The west pier now hosts a Celestron 11-inch telescope, an upgrade over the previous 10-inch telescope. The observatory instrumentation consists of a spectrometer and sensitive digital cameras with astronomical filters.

Roughly 1,000 students in astronomy courses use the facility throughout the year, and students and faculty will be able to use the new observatory for research projects. These projects are a defining part of the Department of Physics & Astronomy's degree programs. The observatory holds several free public viewing nights each semester. The new space will continue to host the American Association of University Women's (AAUW) Tech Trek program, where young girls interested in math and science are encouraged and empowered to study astronomy.

Observatory Director Scott Severson, who oversaw the reconstruction project, said there are many people to thank, "If not for finding champions for authentic science experiences on campus, Dean Stauffer and Chair Cominsky chief among them, we wouldn't have this brand new facility." Dr. Thomas Targett, an astronomy professor involved in the project, hopes that students from all walks of life come check out the new space. "One of the reasons I feel lucky to be an astronomer is that almost everyone has some innate interest in the sky," says Targett. "Even if you are not a STEM student, who wouldn't want to learn about the Universe they live in?"

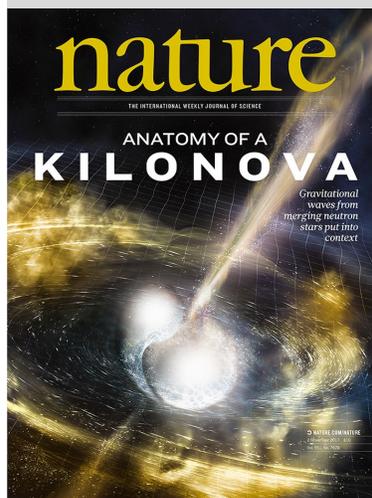
Portions of this article appeared in an article at news.sonoma.edu.

Illustrating the Invisible



Aurore Simonnet/Sonoma State/Caltech/MIT/LIGO

As SSU E/PO's (Education and Public Outreach) scientific illustrator, it is often Aurore Simonnet's job to illustrate phenomena invisible to the human eye. Some of her recent work has centered on gravitational waves, first detected by the Laser Interferometer Gravitational-Wave Observatory (LIGO) earlier last year. Her artistic representation of the merging of two black holes resulting in LIGO's third detection of gravitational waves (above) was recently published in *The New York Times*. Another gravitational waves-related illustration, "Black Holes of Known Mass," was selected as the June 2 [NASA Astronomy Picture of the Day](#), making it her third appearance on the site.

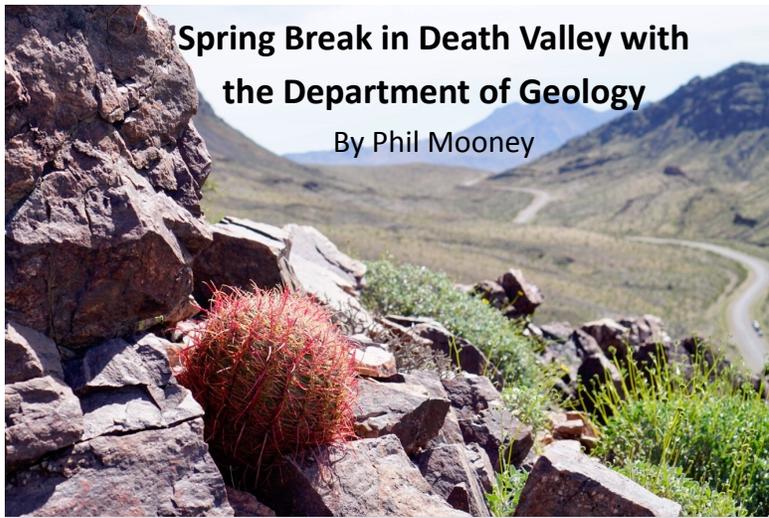


The November 2 issue of *Nature* features an illustration by Simonnet on its cover (pictured left). This will be her first *Nature* cover; she has two previous *Science* magazine covers. The artwork was finished while evacuated from her home in Santa Rosa. Professor Lynn Cominsky, Physics & Astronomy Department Chair and E/PO Director, writes, "[We] are so proud of her! It is quite a testament to her spirit that she persevered despite living in a hotel room with her 6 cats!"

To learn more about the imaginative Simonnet, please read Becky Brisley's piece in [The Press Democrat](#).

Spring Break in Death Valley with the Department of Geology

By Phil Mooney



Hot desert sun beats down on a barrel cactus nestled in a crack between pink-hued slabs of rock. The rock, a glistening quartzite, snakes its way down the barren and boulder-strewn hillside as a lizard scampers towards the welcome shade cast by the cactus, its head flitting back and forth as it scans the isolated surroundings. The air is still and the landscape eerily quiet, the only noise the distant whine of a car making its way through Emigrant Pass. The road traces the historic Old Spanish Trail, a route used in the 1800s by packhorses and herders as they crossed the desert on their way from New Mexico to California. Time seems to pass more slowly out here in the desert just south of Death Valley National Park, and the landscape appears eternal and unchanging.

“Hey Anthony!” A deep bellow pierces the peaceful scene as a sun-worn field hat appears over the nearby ridge. “What’s the orientation of the Zabriskie where you’re standing? I’m dipping 42 degrees here.” The voice is that of Dan Martin, a senior geology major at Sonoma State University. “Right here it’s at 36, and the strike is a bit further to the north. I think we may have crossed a fault.” The response comes from Anthony Gamboa, another classmate in the geology department at SSU. “That’s just what I thought, guys, it’s another high angle normal fault. That explains the rotated block behind you,” responds Kaitlyn Fleming, a senior geology major at SSU and final member of the 3-person mapping group.

The students are out in the desert doing geologic mapping as part of a weeklong field geology course, Integrative Field Experiences, and they are discussing the orientation of a particular sedimentary rock unit to understand and unravel the geologic history of the area. Although the landscape may at first appear eternal and unchanging, the students are learning first-hand that it is anything but. The rocks have been buried, tilted, faulted, folded, and deformed in the 500 million plus years since they were deposited in a continental shelf environment in the Cambrian Period. It is the task of the 14 students in the class to identify the various rock units, observe the complex angular relations between them, record the orientation and structural trends within the units, and create a professional-looking geologic map during their 8 days of



Kaitlyn Fleming, Dan Martin and Anthony Gamboa mapping in Emigrant Pass .

fieldwork. Back in the classroom, the students will occupy the remainder of the semester with cataloging their observations and data to write a report summarizing the geologic history of the area.

The class was brought down to the Death Valley area by David Bero and Phil Mooney of the Department of Geology as part of GEOL 420: Integrative Field Experiences, a course often referred to by those in the department as “Senior Field”. While many of their contemporaries are enjoying their Spring Break in exotic locales, these students spend their week south of Death Valley honing their ability to make valid geologic field interpretations through detailed field mapping and report writing. Senior Field is the capstone course of the geology major, and presents the students with the opportunity to demonstrate the skills they’ve acquired within their core courses.

Students spend their week at the SHEAR Center (Shoshone Education and Research Center) in Shoshone, CA, a cooperative research station that facilitates field trips and research in the Death Valley region. They are up for breakfast and to pack their lunch at 6 am each morning and out in the field by 8:30 am. After a full day of geologic mapping, scrambling off trail, up and down the mountains in order to walk the contacts and observe the outcrops, they are back at the research center by 6 pm to eat, put their feet up, and get ready for the next day of mapping. The trip is strenuous both physically and mentally, but students always leave the field with greatly improved skills and much more confident in themselves as geologists.

Staying in the geologic wonderland of the Death Valley area, we are always able to squeeze in a little entertaining geo-tourism. Students take a rest day from the field in the middle of the week and head into Death Valley National Park to view some of the incredible geology on display on a massive scale.

The combination of unique geology and perfect exposure of the rocks, due to the lack of vegetation, makes Death Valley a wonderful place to take in the sights and do some geologic arm waving. Students see the unique “turtlebacks” and walk the lowest point (282 feet below sea level) in the

continental US at Badwater, view the evaporates at the Devil’s Golf Course, explore the ancient deformed lake bed deposits at Zabriskie Point, and take in the massive scale of the valley at Dante’s View.

Integrative Field Experiences is a significant highlight of the education that our students receive as Geology majors at Sonoma State University. The amount of field training our graduates receive is equal to or greater than any other educational institution in the United States. This really sets our department apart, cements our reputation at the national level, and leaves our graduates prepared for successful careers after graduating.



Maureen Redmond at Devil’s Golf Course.



Kaitlyn Fleming taking in the view at 5000 feet above Death Valley at Dante’s View.



COAST Internship

By Emily Sperou

A photo of the reef top on Cordell Bank. *Photo by Clinton Bauder.*

I was honored to be a COAST intern this summer, working for National Oceanic Atmospheric Administration (NOAA) Cordell Bank National Marine Sanctuary (CBNMS). Cordell Bank is located about 20 nautical miles off the coast of Bodega Bay. The sanctuary was established in order to protect and preserve the extraordinary marine ecosystem surrounding Cordell Bank. It is an extremely productive marine area, home to many invertebrate species and a feeding area for marine mammals.

The 8-week internship was exactly what I needed to get more involved and to receive more research experience. Throughout this internship, I worked on two main projects. The first project was to create a taxonomic guide of the benthic invertebrates found on Cordell Bank. Making this taxonomic guide not only gave me more knowledge about invertebrates, but it also allowed me to gain even more insight about the sanctuary.



Sperou next to the ROV Phantom DS4.

The guide was created as an educational tool for all audiences, and to be used on remotely operated vehicle (ROV) cruises to distinguish the species that are found. This taxonomic guide will soon be posted on CBNMS's [website](#). My other project consisted of working on a ROV with a member of CBNMS. While working with the ROV, I was able to learn about the mechanical and operational sides of this extraordinary machine.

On the last week of my internship, I was privileged to join the CBNMS staff on their 2017 ROV Cruise. This cruise consisted of going out to the Cordell Bank for 9 days and surveying different transects made on the bank. This cruise allowed me to actually witness the vast diversity of species and habitats found on the bank.

Throughout the cruise, we surveyed habitats around 70 meters, consisting of cold-water coral reefs and the beautiful creatures living in the reef. We also surveyed deeper water habits ranging 100-plus meters, where we saw more soft sediment bottoms and the

different invertebrates that inhabited the bottom.

Overall, this was an amazing internship that not only gave me vital knowledge about CBNMS and this marine protected area, but it also gave me more hands-on experience and understanding about the field of marine biology.

Summer Soirée



Nursing students Paige Baltimore and Juliane Dieken volunteered at the Health Foundation Northern Sonoma County's Summer Soirée fundraising event on August 26. The event helped raise money for funding health access, mental health and early childhood development in the northern region of Sonoma County.

Healthcare Foundation Northern Sonoma County's CEO Debbie Mason writes, "The event was a great success and we owe it to many folks, like [Paige and Juliane], who did such an awesome job in providing assistance to us."

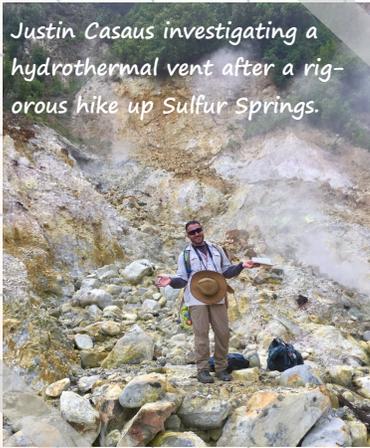
LSAMP Luis Stokes Alliance for Minority Participation

- Math majors Travis Hayes and Juan Escobar Salsedo and biochemistry major Robert Boyd all started graduate studies at CSULA this fall. As part of the [LSAMP](#) Bridge to the Doctorate, they will receive funding for two years (\$32,000 per year and tuition and fees paid) while pursuing a master's degree.
- Math Majors Terris Becker, Crystal Salas and Juan Escobar Salsedo spent the summer in Uzbekistan studying Leibniz algebras. Salas and Escobar Salsedo were supported by LSAMP.

Notes from the field:

Two members of the Department of Geology at Sonoma State University, student Justin Casaus and newly hired faculty member Dr. Laura Waters, participated in a KECK Research Frontiers program in Dominica (located in the eastern Caribbean Sea) along with fifteen other students and three other leaders from colleges across the US. Though small (750 km²), the island of Dominica has a total of nine volcanic centers, which are a known threat for communities in the surrounding area with little to no options for hazard mitigation. Research on the erupted lavas may help the people of Dominica by identifying the conditions at which the magmas were stored prior to eruption.

Justin Casaus investigating a hydrothermal vent after a rigorous hike up Sulfur Springs.

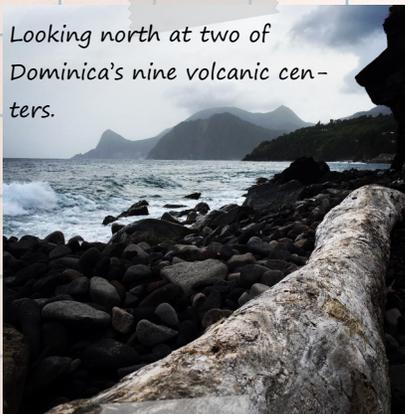


Over a period of two weeks, students and leaders collected samples of volcanic rocks, hydrothermal waters and gasses, and steam sediments from each of the nine eruptive centers on the small island. After field work, students traveled to Union College for a two-week period to conduct a variety of analyses including grain size analyses, wet chemistry, Inductively

Coupled Plasma Mass Spectrometry (ICPMS), x-ray diffraction (XRD) and quantitative scanning electron microscopy (SEM).

Motivating scientific questions for the research component that will take place here at SSU focus on addressing the differences between the pre-eruptive conditions for the voluminous ignimbrite eruptions (large, explosive eruptions of ash and magma) and their extruded counterparts, the resurgent domes. Our initial results show that these magmas contained high amounts of water (5-9 wt% H₂O) as recorded minerals, which requires that the Dominican magmas are origination at depths ≤ 15 km. These results imply that: (1) the origin of the magmas erupting the Lesser Antilles are deeper than previously thought based on the melt inclusions (~5 wt% H₂O); and (2) the time that passes from magma formation to eruption is remarkably fast.

Looking north at two of Dominica's nine volcanic centers.



Results from this work will be presented at the upcoming fall meeting of the American Geophysical Union and at the Sonoma State Symposium of Research and Creativity. The participants in the Keck Frontiers project from SSU express their gratitude for the funding received through the

Keck Consortium, for the support and time investment of the fund administrators at both Macalaster and Union Colleges that was so fundamental to the success of this project. —*Dr. Laura Waters*

Third year Geology major, Sonny Hutchinson, participated in a National Science Foundation funded Research Experience for Undergrads (REU) over the summer. His REU took roughly 20 students from around the US and Mexico to Baja California Sur, Mexico during the winter break for field research in volcanology.

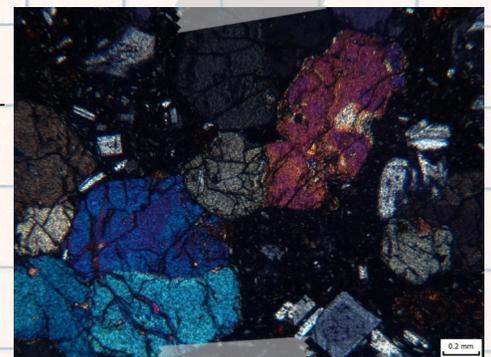
In Mexico, they broke into different groups to study the different geological aspects of the volcanic and tectonic setting of Baja California. His group mapped a previously undifferentiated area and in the process un-

covered several shield volcano complexes as well as an associated dike swarm. After the field portion had concluded, his REU group convened at the University of Missouri to examine the samples collected. He analyzed thin sections with petrographic microscopes, a Scanning Electron Microscope (SEM), and X-ray diffraction. He used his skills from Geology's computer apps course to construct an updated field map with GIS.

Hutchinson's research will be presented at the American Geophysical Union Annual Meeting in December. When asked about the experience,

Hutchinson states, "The REU has been, and continues to be, an

amazing and enlightening opportunity. The amount of quality mentorship available to me throughout this experience has granted me invaluable insight into the world of geologic research and the processes involved. At this stage I am excited about attending the conferences in the near future and I feel confident that I am part of something is as challenging as it is rewarding." —*Sonny Hutchinson*



SST News in Brief

- The Computer Science Department has brought SSU into the **Academic Alliance of the National Center for Women in Information Technology (NCWIT)**. SSU joins 12 other CSU campuses and 9 UC campuses as NCWIT Academic Alliance members. This membership connects us to other schools and departments who have made a commitment to fostering representation of women in technology fields. It also opens up scholarship opportunities for students and connects our campus and students to networking and conference opportunities.
- Engineering students participated in the **Latino Family Summit** event on March 25. Electrical Engineering students showcased their projects and explained to participants what electrical engineers do. The Summit is a great opportunity for the community to learn more about STEM as well as meeting current STEM students.
- For the first time, three teams of Engineering students presented their research at the **Northern California Undergraduate Math Conference** at SSU on March 25: Michael Vargas, "Understanding Light Propagation in Multi-Mode Fiber Optics"; Aaron Marquez, Michael Dunn and Jaime Ciriaco, "Developing Real-Time Statistical Algorithms to Detect Seizure"; Abraham Palmerin and Randy Hania, "Analysis of a Mathematical Model for Underground Wireless Communications"
- The Society of Women Engineers (SWE) club participated in the **2017 Expanding Your Horizons (EYH) Conference** at SRJC in April. EYH is an event to increase the awareness of young women and their parents of the importance of adequate preparation in STEM. Rona Jergenson, Cristin Faria and Cassandra Abad demonstrated several hands-on activities and shared their experiences as SSU engineering students. They encouraged participants to explore engineering careers.
- Professor and Computer Science Department Chair Suzanne Rivoire served as the General Chair for the **IEEE International Symposium on Performance Analysis of Systems and Software (ISPASS)**, held in Santa Rosa in April. This conference brought together leading computer performance analysis researchers from North America, Europe and Asia.
- On April 21, several students from Rio Lindo Adventist Academy in Healdsburg visited the Engineering Department. During their visit, each student built a simple blinking LED circuit using a couple transistors. Shahram Marivani, Engineering Department network analyst and lecturer, led the activity. For many, this was their first electronic circuit.
- Two engineering students, Michael Vargas and Joe Nolan, along with lecturer Derek Decker were invited to attend the twenty-third annual **NIWeek** conference to present their poster entitled, "LabVIEW Controlled Pneumatic Robot." More than 4,000 innovators representing a spectrum of industries participated in this event sponsored by National Instruments (NI) in Austin, TX.
- Professors Gurman Gill and Mark Gondree received a **Course Redesign with Technology grant** to redesign CS 115 (Programming I). Their award is one of 4 given to SSU and the only one in SST.
- Three teams of engineering students were invited to participate in the **Sensors Poster Contest** sponsored by **Sensors Expo and Conference 2017**. The event gathered more than 6,000 professionals and students from across the nation and over 40 countries to explore today's sensor technologies and to find the solutions to tomorrow's sensing challenges.
- David House was invited to the **2017 Ignite Smart Cities Connect Conference and Expo** in Austin, TX in June to assist with the workshop, "How to Design a Smart City." Dew Mobility sponsored the workshop. About 70 professionals and engineers participated in the workshop, the objective of which was to offer an overview of IoT applied while designing smart city applications. During the workshop, House gave a talk on fundamentals of IoT infrastructure and networking technologies.
- **The Chronicle of Higher Education's** July 17 article titled, "[How Community Service Can Help Your Career](#)," features professors Martha Shott and Thomas Targett (Departments of Mathematics & Statistics and Physics & Astronomy, respectively) and SSU's community service requirement in the Retention, Tenure and Promotion (RTP) process.
- Family Nurse Practitioner students and faculty went to Casa Grande High school on July 29 to provide free pre-participation sports physicals for athletes.



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Local High-Tech Links with Undergrads

Viavi Solutions, Inc., a local tech company, opened up their facility to senior electrical engineering students under the tutelage of Ali Kujoory this fall. Of particular interest was the company's optical security processes that are being used to print currency notes and their nanometer coating technologies used for different applications.

R E S E A R C H

SUPPORT GROUP

Mondays 4:00 to 5:30 pm
Darwin 300C

- * Data analysis
- * Automation
- * Electronics
- * Literature search
- * Practice talking about your project
- * Moral support
- * Help other researchers
- * Drop-in or stay the whole time
- * Work on your project
- * Learn from demos on varied topics

Contact Dr. Bogdan
 Negru with any
 questions:
negru@sonoma.edu.



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- Martha Murphy, Department of Geology, is one of three honorees selected for the **Outstanding Adjunct Faculty Award** given by the [National Association of Geoscience Teachers Geo2YC Division](#). Along with her fellow nominees, Murphy will be considered for the Annual Outstanding Adjunct Faculty Award for 2017. She will be featured in an upcoming issue of their newsletter, Foundations.
- Professor Mark Gondree reported a security vulnerability to the Department of Homeland security through their **Industrial Control Systems Computer Emergency Response Team (ICS-CERT)**. He has been working with their team over the past year sharing findings, as they worked with the vendor through their responsible disclosure process. The software defect he reported impacts a specific model of programmable logic controller manufactured by Allen Bradley. These embedded systems are used in manufacturing, food and agriculture, transportation, water and wastewater systems to control industrial equipment. The vulnerability opens up the possibility of a single-packet Denial of Service (DoS) attack, allowing some network-connected, industrial systems to be shutdown remotely. The ICS-CERT assigned this vulnerability a CVE number, issued an advisory and rated its CVSS score as 7.5/10, characterizing it as the 'High' severity. The manufacturer has since released new firmware for the device and has alerted its customers.
- Professor and Chemistry Department Chair Carmen Works has received a 3-year award from the National Science Foundation for her project Mechanistic Investigation of Iron-Iron Hydrogenase Model Compounds for the Reversible Oxidation of Molecular Hydrogen, for a total of \$180K. This supports Works' lab with several undergraduate researchers contributing to the project.
- Professor Mark Perri, Department of Chemistry, received an **SSU Educational Experience Enhancement Award** for his Chemistry Computer Science Gateway, a website where undergraduates around the world can access supercomputers to perform computational chemistry. Perri is working on bringing computational chemistry to lower division chemistry courses. Perri received a research allocation award on the **XSEDE Supercomputer Network** for his gateway. Additionally, Perri gave a talk on the gateway at the **American Chemical Society National Meeting** in Washington, D.C. in August, and he gave an invited webinar on the gateway for the **Science Gateways Community Institute** in September.
- Dean Lynn Stauffer was named one of **INSIGHT Into Diversity's 2017 Inspiring Leaders in STEM**. The award recognizes leaders from underrepresented groups who are making a difference in STEM fields. Stauffer is recognized for her many achievements, including the establishment of the WICS group, the STEM Certificate Pathway program with Piner High School, and the S3 grant.

It's October—Time to do Math at Whiskeytown Lake!

A longstanding fall tradition in the Math and Stats department is the annual math camping trip to the [State of Jefferson Mathematics Congress](#). Every first weekend of October, a group of math and stats students and faculty head to a campground at the Whiskeytown Lake Recreating Area near Redding to meet up with colleagues from other Northern California and Southern Oregon Universities (hence, State of Jefferson Congress). The congress program includes kayaking, hiking, stargazing, marshmallow roasting, and, of course, learning some new math.



Professors Elaine Newman, Natalie Hobson and Martha Byrne

One of the three math talks this year featured SSU's Martha Byrne discussing "Dynamic Graphs, Continuous Functions, and Fixed Cycles." The program also included "Conway's Rational Tangles" by Corey Shanbrom from Sacramento State University, and the "Discussion under the Oaks—Enhancing Teaching Introductory Statistics" led by Kenneth Davis and Joseph Reid from the Oregon Institute of Technology.

Once again, SSU won the unofficial "largest contingent" contest with 25 participants, including 10 students attending the conference, thanks to the math club, which organized car pooling, a camping gear exchange, and a taco bar for a group dinner.



SSU Math Majors

Martha Byrne's talk was very well received, and so was the musical speaker introduction to the tune of "12 Days of Christmas" by Natalie Hobson.

—Dr. Brigitte Lahme

Excellence in Teaching



Professor Jeremy Qualls, Department of Physics & Astronomy, was selected as one of two recipients of the **2017-18 Excellence in Teaching Award**. Among his many accomplishments is the just-opened SSU Makerspace, made possible by the \$600,000 NSF

grant Qualls secured. The SSU Makerspace is a testament to Qualls's dedication and innovation. He is an inspiring teacher who goes above and beyond for his students, his colleagues, the School of Science and Technology, and the entire University. An advocate for life-long learning and expanding your mind, his philosophy centers on empowering students and encouraging them to challenge expectations. This is a truly well-deserved honor.

Excellence in Research



Professor Dan Crocker, Department of Biology, was presented the **2016-17 President's Award for Excellence in Scholarship** at the 2017 Faculty Research and Scholarship Symposium on May 4. Crocker is an internationally recognized scholar in marine ecological physiology with a distinguished record of research achievement including highly-regarded

publications, substantial funding from the National Science Foundation and the National Institutes of Health, and esteemed contributions to his research community included his appointment as a California Academy of Sciences Faculty Fellow. He is a strong advocate of the teacher-scholar model and is deeply committed to undergraduates and graduate students. Crocker is most deserving of this special recognition.



Further Honors for Cominsky

The International Astronautical Federations has selected Physics & Astronomy Professor and Chair Lynn Cominsky as the recipient of the 2017 Frank J. Malina Astronautics Medal. The award was presented at the annual meeting of the International Astronautical Congress in

Adelaide, Australia, on September 29, 2017. The Malina medal recognizes outstanding contributions to space education by an educator who promotes the study of astronautics and space science. Cominsky also delivered a keynote address at the IAC meeting, entitled “Building the STEM Pipeline with Rockets, UAVs and CubeSats.”

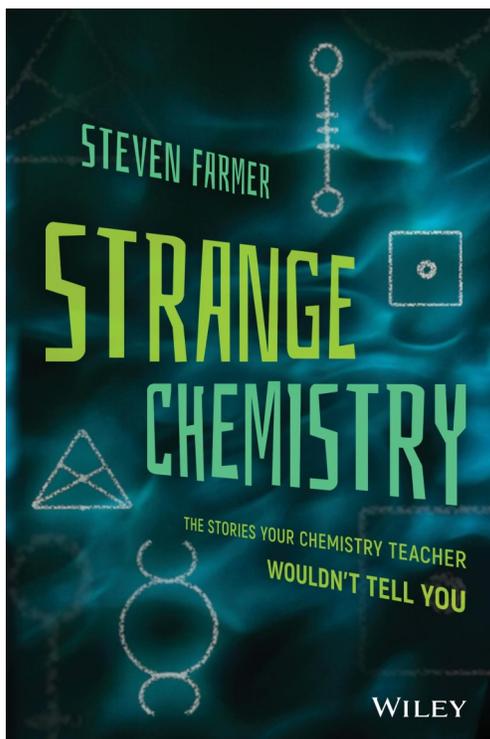
On October 10, 2017, Professor Cominsky was inducted as a Fellow of the California Academy of Sciences, joining fellow SST faculty Matt James (Geology) and Dan Crocker (Biology). Cominsky is also a fellow of the California Council on Science and Technology, the American Physical Society, and the American Association for the Advancement of Science.

Photo above: Prof. Cominsky helps SHIP Intern Emma Quinlan load her rocket in July 2017 near Fresno, CA. To read more about their trip to Fresno, visit: lylescollegenews.com/2017/07/17/nasa-minority-research-project-takes-flight.

Earth Cube

Professors Matty Mookerjee (Department of Geology) and Gurman Gil (Department of Computer Science) recently acquired NSF funding for the collaborative project, EarthCube Data Infrastructure: A unified experimental-natural digital data system for analysis of rock microstructures. This collaborative proposal involved six additional PIs from six other institutions. Rock microstructures are widely used

in the geological and geophysical communities to reconstruct tectonic and deformation history, to interpret the forces and processes responsible for that history, and to provide bases for theory and models of deformation behavior. Microstructures relate processes at the microscopic scale to phenomena at the outcrop, orogen, and plate scales. At present, there is no digital mechanism for data access and manipulation of images of rock fabric, mineral textures, and deformation structures. Our proposed data system will fundamentally change how microstructural work is done by facilitating interaction between practitioners of experimental deformation, those studying natural deformation, and the cyberscience community. Our work will facilitate investigations of rock strength and rheological behavior and real-world deformation processes. The development of analytical tools and workflow analysis—image analyses, geometric statistics, and machine learning—will facilitate linking and analysis of microstructural images and data between any number of natural or experimental environments. These tools are generally applicable to all types of imagery, extending the impact of this work.



John Wiley and Sons published Professor Steven Farmer’s book *Strange Chemistry: the Stories Your Chemistry Teacher Wouldn’t Tell You* in July 2017. The book’s description reads:

Did you know that many components of food come from quite unexpected sources, for instance, Gummi Bears® are shiny because they are coated with bug secretions, and many packaged luncheon meats have viruses added to them?

Strange Chemistry opens the audience’s eyes to the extra-ordinary scientific secrets hiding in the everyday objects around them. The book covers broad subjects that touch on everyday life, including the chemistry of poisons, illicit drugs, explosives, foods, common household products, and radiation.

Readers will find the information not only intriguing, but also absorbing and edgy. Unlike other science interest books, Strange Chemistry focuses on the darker, wilder side of chemistry, which, unfortunately, most authors and chemistry teachers tend to avoid.

Designing 6-8 Math Curriculum

To divide by a fraction, why do you invert and multiply? How can students discover that the circumference of a circle is a little bit more than three times its diameter?



These are the questions Mathematics & Statistics Professor and Chair Brigitte Lahme has wrestled with over the last two years as one of the writers of the recently published *Illustrative Mathematics 6-8 Grade Math Curriculum*. Illustrative Mathematics (IM) is an organization that has been helping teachers transition to the Common Core State Standards in

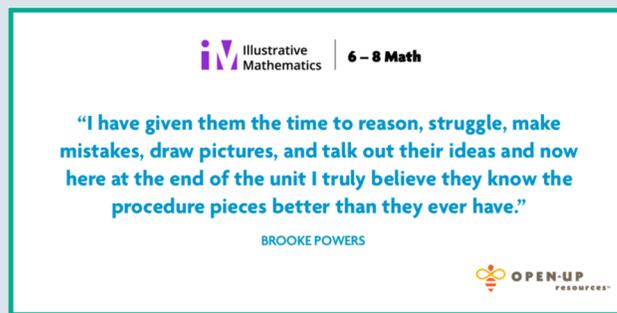
mathematics since their adoption by many states in 2010. IM was chosen to develop a free, high quality curriculum for the middle grades by a consortium of 11 states that saw the need for better classroom materials. Lahme was one of the mathematicians in a team of over 30 teachers, math educators, math professors and other education specialists to tell a coherent mathematical storyline through activities, lesson plans, assessments, teacher materials and resources for parents. Often students get the impression that learning mathematics only consists of memorizing isolated facts and practicing tedious skills, when in fact it should be an exciting discovery of ideas that fit together and build on each other into a beautiful story and a powerful toolset for exploring the world. In our curriculum, each lesson and each unit tells a story introducing new characters and integrating them with old friends. For example, dividing by a fraction extends the idea of dividing whole numbers. A cookie recipe asks for 2 cups of flour, how many batches of cookies can you make from 10 cups of flour? Now replace 2 and 10 with your favorite fractions: A recipe asks for $1\frac{1}{2}$ cups of flour; how many batches of cookies can you make with $\frac{3}{4}$ cup of flour? Half a batch—it still makes sense.

IM created a problem-based curriculum. Each lesson is designed so that students spend most of the instructional time working on well-crafted activities that lead them through important mathematical ideas. The teacher helps the students understand the problems and guides discussions where the mathematical take-aways are connected and made explicit.

The curriculum contains a small set of instructional routines that support teachers to create classroom where students are actively engaged in the learning process. Often a lesson starts with a warm-up where students are presented with a visual representation and asked, “What do you notice? What are you wondering about?” This open question invites students at all levels to engage with the mathematics.

During the writing process, the curriculum was piloted by 175 teachers around the country. Based on teacher and student feedback, the group revised the materials, which are now available online at no charge. To explore the material, please visit:

im.openupresources.org. The feedback so far has been really positive:

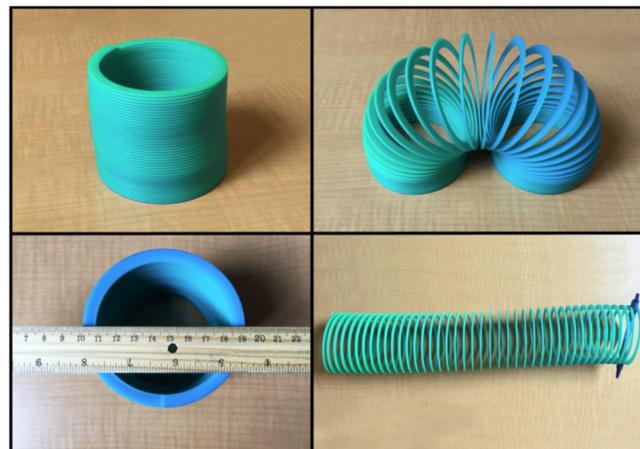


Working on the *Illustrative Mathematics 6-8 Grade Math Curriculum* has been one of the most rewarding projects of Lahme’s career as a math professor. It has enriched her own teaching and she was able to bring experiences from her work at SSU into the materials. In seventh grade, one of the culminating experiences is based on a maker activity Lahme developed as part of Project Make the Way—a collaboration between SSU math educators and Santa Rosa City Schools. In this activity, students make a trundle wheel and use it to design and measure a 5K race course on their school grounds. While Lahme was writing-up the activity for the illustrative math curriculum, teachers in Santa Rosa implemented it with their students.

Lahme is excited to continue on the next project with IM—designing high school curriculum. The timing is fortuitous since it coincides with the Mathematics & Statistics Department’s work of redesigning our developmental math program. Lahme is currently teaching a year-long calculus course for students who are not quite ready for a traditional calculus 1 course; designing the high school curriculum will certainly benefit from her work on the stretch course and vice versa. —Dr. Brigitte Lahme

"Are you ready for more?"

Here are some photos of a spring toy.



If you could stretch out the spring completely straight, how long would it be? Explain or show your reasoning.

A sample seventh grade activity.

Commencement 2017



The new administration reorganized Commencement for 2017. Instead of two large ceremonies held on the Saturday after finals, each academic school held their own over the course of the weekend after finals. With this change came the ability for academic schools to customize and personalize their individual ceremony. The School of Science and Technology asked graduates interested in being our student speaker to submit a speech for consideration. After reviewing the four speeches submitted, our council of department chairs selected Electrical Engineering major Miah Crockett as our 2017 Commencement Student Speaker.

All four applicants are outstanding representatives of our School and exemplify our strong commitment to learning, research, leadership and service. It was tough to select just one! All four speeches are available for you to read [here](#).

We hope you enjoy reading about their journeys here at SSU and in the School of Science and Technology.



President Sakaki, Miah Crockett and Dean Stauffer

Nick Soleil, recent Electrical Engineering graduate, was featured on a *This Old House* video, "[How to Install Home Solar Storage.](#)" Soleil is currently employed at Enphase Energy and working on a solar storage system.

Solar Storage



<<Distinguished Alumnus>>

Geof Syphers (B.S. [Physics '93](#)) was named one of two [SSU Distinguished Alumni](#) for 2017. Syphers is the CEO of [Sonoma Clean Power](#). SSU's Distinguished Alumni Awards Program recognizes our most distinguished and prestigious alumni from the six academic schools. It serves to recognize their professional achievements, contributions to society and support of SSU. Syphers is pictured above with President Judy K. Sakaki and Dean Lynn Stauffer at a dinner hosted by the President in May 2017 honoring the awardees.



Recent computer science graduate Rigoberto Moreno Delgado was profiled in the official Raspberry Pi magazine, *The MagPi*, Issue 60, August 2017. Raspberry Pi is an extremely low-end, affordable single-board computer that supports programming education and hobbyists; at least 11 million have been sold. For Moreno Delgado's senior project, he built a cluster of Raspberry Pis and evaluated the performance of supercomputing benchmarks that are designed to run in expensive, large-scale facilities.

Moreno Delgado was a research student of Dr. Suzanne Rivoire, Computer Science Professor and Department Chair. Rivoire says of her student, "I am super proud of Rigo in general; he is a local student from Roseland who fell absolutely in love with supercomputing and is now living the dream at [Lawrence Livermore National Laboratory], and proud of this specifically!"

Read the article here (article starts at page 82): www.raspberrypi.org/magpi-issues/MagPi60.pdf.



Alumni Shine at M*A*T*H Colloquium

Many of the SST departments run a [weekly colloquium series](#) and the Mathematics and Statistics Department is proud to be presenting their eighty-seventh series this fall. It is always exciting for faculty and students when some of our graduates come back to give colloquium talks about the use of mathematics and statistics in their careers. This semester's colloquium features three talks by SSU math and stats alumni.



The Donahue-Balboni family.

On September 13, Aaron Donahue (B.A. in mathematics 2007) gave a talk titled "Computational Applications in Hurricane and Climate Modeling." He shared mathematical models developed during his

work as a Ph.D. student in engineering at Notre Dame University and as a staff researcher at Lawrence Livermore National Laboratory. He visited with his wife, Enrica Balboni, also an engineer at Lawrence Livermore Laboratory, who gave a talk about "Environmental and Nuclear Forensic Studies of the Actinide Elements" for the Geology Lecture Series the same day.

On October 18, Greg Morre (B.A. mathematics 2009) presented a talk titled, "Gerrymandering and Geometry." He discussed how mathematics can be used to detect and prevent gerrymandering. Morre is now an instructor at Santa Rosa Junior College. He received his Ph.D. in mathematics from New Mexico State University in 2016.

The last talk of this semester will be by Jessica Balli (B.A. mathematics 2005, M.A. education 2015) on November 29. After working as a high school teacher for many years, Balli is now helping school districts improve assessment practices as an educational consultant with Callahan Consulting.

The M*A*T*H Colloquium is open to the public. Talks are Wednesdays at 4 pm in Darwin 103 with tea and cookies at 3:45 pm. —Dr. Brigitte Lahme



About fifty Physics & Astronomy alumni and current students, faculty and emeriti gathered at Sally Tomatoes on September 10, 2017 for a reunion dinner.

The award for "longest road to the reunion" went to Ken Ritley ('88) who traveled from Switzerland to reconnect with mentors such as Emeritus Professors Joe Tenn and Gordon Spear. James McBride and Frederick Arioli tied for the "OA" (Original Alums) recognition, as both graduated in 1975. McBride is an independent wealth management advisor in Petaluma who previously served as president of SSU's Alumni Association. Arioli retired in 2014 after many years as an engineer at [Lockheed Martin Space Systems](#) in Palo Alto. He worked on software for several space missions, including the [Spitzer Space Telescope](#) and the forthcoming [James Webb Space Telescope](#).

Posters from the SST Science Symposium enlivened the event, which was followed by a private viewing at the newly refurbished SSU Observatory (see page 3), and tours of the then not-yet-open to the public Makerspace in the Schulz Library. It was great reconnecting with our alums and sharing the research interests of the current faculty! —Dr. Lynn Cominsky



Professors Tom Targett and Scott Severson with alumna Aman Gill and Stephanie (Church) Winningham at the new SSU Observatory.

Are you a SST alumnus? We would love to hear from you! Keep us up-to-date on your personal and professional accomplishments by emailing:
science.tech@sonoma.edu

RFDC

In July, 500 kindergarten through eighth grade students from Sacramento's [Roberts Family Development Center](#) (RFDC) visited Sonoma State University—the largest group to ever visit campus. This was the second annual "I am the Future Day" visit by RFDC, an event spearheaded by President Judy K. Sakaki to introduce children from an underserved community to college life. Many of these students would be the first in their family to attend college, so the hope is that this experience makes them consider college as a real possibility.

Part of the day's events included demonstrations by different departments and organization on campus. Department technicians, faculty members and students from Biology, Chemistry, Engineering, Geology, Nursing, and Physics and Astronomy prepared interactive stations for the students to visit:



In April, the Nursing Department participated in a 5k mud run as a team building exercise. They hope to make this an annual event with SST-wide participation. Way to go!



Professors Mark Gondree and Gurman Gill with their research interns at the 9th annual [Summer High School Internship Program](#) (SHIP) Symposium. The SSU and SCOE partnership supported 15 interns and 12 faculty mentors this year.

1. Phil Mooney, Geology Department Technician, showing fossils and rocks to inquisitive youngsters. 2. Two students at the Nursing Department's hand-washing station; participants applied "germs" (iridescent lotion) to their hands, washed them, and then a black light was applied to show how thoroughly they washed. 3. Chemistry majors man the department's booth. 4. Patricia De La Torre conducts an experiment for onlookers. 5. Keenan Raleigh shows off an insect. 6. Ivy Burge, Wendy St. John and Dustin Howland with some of the Biology Department's insect collection. 7. Shahram Marivani, Engineering Department Network Analyst, mans his department's table.