



STEM
COLLABORATIVE
CENTER

STEM University Snapshot 2015 - 2018



STEM University is the student engagement component of the **UNM STEM Collaborative Center** (STCC). The STCC is currently in the fourth year of a five year \$2.6 million US Department of Education grant focused on improving science, technology, engineering and mathematics (STEM) graduation rates at the University of New Mexico, especially Hispanic and low-income students.

STEM University provides outside-of-classroom STEM-based student engagements through three formats: **Discover STEM**, **STEM Leadership** and **STEM High-Engagement Events**.

Discover STEM events are designed to provide students with a brief introduction to STEM majors, research, technology, and faculty members. These short sessions are often part of larger events or conferences. Notable examples include: 1) presentations at the Shared Knowledge Conference, 2) Discover Your Science Day for incoming first-year students, and 3) undergraduate research introduction sessions at Opt-In for New Student Orientation.

STEM Leadership engagements are designed to provide students with more extensive support for their STEM educational goals. Our most successful STEM Leadership engagement is the STEM Mentorship program that pairs UNM undergraduates with scientists and engineers at the Air Force Research Laboratory (AFRL) and Sandia National Laboratories.

STEM High-Engagement Co-Curricular Events provide students the opportunity to dig deeper into a particular research arena, or to engage further with faculty members or other scientists/engineers. This booklet details many of the STEM high-engagement events held over the past three years.

The three **STEM University** formats have one important element in common: partnerships. STCC staff do not create or implement events in isolation. As you look through this booklet, you will notice the many UNM, AFRL, Sandia and other scientists, engineers and educators who have lent their expertise to UNM's undergraduate STEM students. Without their generous contributions of time and knowledge, this booklet would be empty, the STCC would not exist, and students would not have such tremendous access to state-of-the-art STEM.

**To our partners, a heartfelt
Thank You! ♥**

PAST EVENTS

2015



So, you want to be a STEM intern? *Spring 2015*

This workshop series taught students how to land a competitive STEM internship.

Faculty/Partner: Kathryn Bellis Talent TVC



Donut Days *Spring 2015*

A mixer for all UNM students, staff, faculty and various members of the local Albuquerque science and engineering community.



Introduction to Caving & Bioinformatics:

Field Day at El Malpais & Data Labwork *Summer 2015*

Students joined the drug discovery team of the Northrup Lab for an expedition to caves at El Malpais. Ara Kooser taught students how to utilize bioinformatics software and explore bacterial chemical interactions.

Faculty/Partner: Ara Koser, Dr. Diana Northrup

Department of Biology UNM

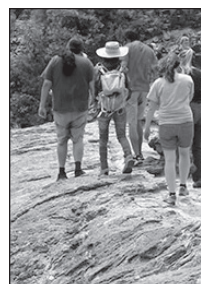


Field Days at Bosque del Apache

& Parasite Laboratory Research *Summer 2015*

Students traveled to the Bosque del Apache National Wildlife Refuge to collect hosts (mostly aquatic snails), and examined them for parasites. After the samples were processed, they were entered into the Museum of Southwestern Biology's Division of Parasites for preservation and future work.

Faculty/Partner: Dr. Sara Brant Department of Biology UNM



Ancient History: Introduction to Archeology Research at the Valles Caldera *Summer 2015*

On a trip to Valles Caldera National Preserve, students discovered how anthropologists and archaeologists are putting the pieces together to understand the people who resided in New Mexico during the last 11,000 years ago. They visited a prehistoric obsidian quarry in the Caldera, to explore how obsidian tools were crafted.

Faculty/Partner: Dr. Ana Steffen Department of Anthropology UNM



Exploring a Supervolcano: Intro to Geology & Hydrology Research at the Valles Caldera

Summer 2015

Students traveled to Valles Caldera, Jemez Springs, where they visited various geology and hydrology research sites located throughout the Preserve.

Faculty/Partner: **Dr. Laura Crossey** Department of Earth and Planetary Sciences UNM

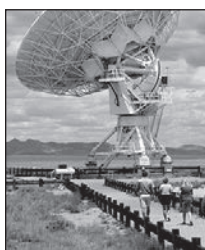


Tour of Wastewater Restoration Plant & Water Quality Lab

Summer 2015

Students toured Albuquerque's Southside Wastewater Reclamation Plant (SWRP) and Water Quality Lab. After the full plant tour, students visited the Water Quality Laboratory.

Faculty/Partner: **Sharon Sivinski** Albuquerque Bernalillo County Water Utility Authority



Peering into Distant Galaxies: Behind the Scenes at the Very Large Array

Summer 2015

On a trip to Socorro, NM students toured the Very Large Array (VLA) radio astronomy observatory. They learned how Dr. Trish Henning studies galaxies hidden behind the Milky Way, and heard how her undergraduate experience helped shape her research.

Faculty/Partner: **Dr. Trish Henning** Department of Physics and Astronomy UNM



ABQ Start-Up Tour

Summer 2015

Students learned more about entrepreneurship and toured exciting start-up accelerators in the Albuquerque Innovation District, FatPipe and ABQid.

Faculty/Partner: **Talent TVC**



Forest Restoration 101: Data Collection & Field Day at the Valles Caldera

Summer 2015

Students spent the day as a forest ecologist at the Valles Caldera National Preserve, and were taught lessons in forest health, restoration, and management.

Faculty/Partner: **Brittney Van Der Werff** Valles Caldera



Sandia Day at the Advanced Materials Lab

Summer 2015

Students learned more about careers at a Department of Energy national laboratory from a panel of Sandia's current STEM interns. Sandia's scientists also talked about their cutting edge research and gave a tour the Advanced Materials Laboratory.

Faculty/Partner: **Sandia's Scientists and Interns**



Conducting Field Transects and Bird Surveys: Field Day at Bosque del Apache

Summer 2015

Dr. Yadéeh Sawyer took students to the Bosque del Apache National Wildlife Refuge where they systematically walked and recorded observations of birds and other flora and fauna of the area (also known as field transects).

Faculty/Partner: **Dr. Yadéeh Sawyer** Stem Gateway UNM



Considering a Career in Medicine

Summer 2015

Dr. James McKinnell helped students explore medicine as a profession through the use of selected readings and discussion with practicing professionals. In addition, he shared tips on developing a strong medical school application.

Faculty/Partner: **Dr. James McKinnell** Office of Pre-Health Professions Student Development UNM



Observing Life Zone Changes at the Sandia Mountains

Summer 2015

On a trip to the Sandia Mountains, students learned about scientific observation via a scavenger hunt and by documenting observations, both written and illustrative.

Faculty/Partner: **Dr. Yadéeh Sawyer** Stem Gateway UNM



Understanding the Impact of Invasive Species on the Rio Grande

Summer 2015

On a trip to the Rio Grande Valley Nature Center, students examined and identified microorganisms within the Discovery Pond. They also investigated the impact of invasive species on the riparian habitat along the bosque trail.

Faculty/Partner: **Dr. Yadéeh Sawyer** Stem Gateway UNM



Tour of Air Force Research Laboratory & Research Presentations

Summer 2015

Students learned more about internships and careers at the Air Force Research Laboratory, as AFRL Scientists led them on tours of various laboratory facilities.

Faculty/Partner: **AFRL Scientists**



Exploring the Geologic Time Record in the Rocks of New Mexico

Summer 2015

The three day excursion included several stops to look at different types of rocks in New Mexico, and an overnight camping trip.

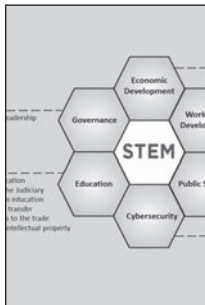
Faculty/Partner: **Dr. Jason Ricketts** The University of Texas at El Paso



STEM Career Fair 101 *Fall 2015*

Students learned how to research employers, build an impressive resume, communicate strengths and interview like a professional.

Faculty/Partner: Office of Career Services, Local Scientists and Engineers UNM



STEM Public Policy Undergrad Fellowship *Fall 2015*

With this fellowship, students learned how public policy is created, and studied current research into STEM education, while exploring their own personal experiences as a STEM student. They also worked with policy professionals to develop a presentation regarding the need for specific changes in STEM education in New Mexico.

Faculty/Partner: Carlos Romero, Meriah Heredia-Griego Center for Education Policy Research Tim Schroeder STEM Collaborative Center UNM



The Science and Implications of Personal Genomics *Fall 2015*

In this course, each student sent in a saliva sample to a company for a personal assessment of their genome. They then discussed the results in relation to health, ancestry, and bioethics.

Faculty/Partner: Jeff Long Department of Anthropology UNM

2016



Departure Podcast: Episode 1, Blood and Essence *Spring 2016*

Participants in the Departure project interviewed local scientists, professors, and artists, and explored creative processes used in their professional and personal contexts. The podcast showcased innovation occurring regionally and at UNM.

Faculty/Partner: Jazmyn Crosby AmeriCorps VISTA Sara Cordova, Isaiah Smith The Social Media Workgroup UNM



Fermenting Root Beer and Building Towers with Middle Schoolers *Spring 2016*

Students shared their science and teamwork knowledge with 6th graders from Albuquerque's own South Valley Academy. They lead this small group of 6th graders, as they made root beer and completed a marshmallow tower challenge.

Faculty/Partner: Community Engagement Center



Tour of the Air Force Research Laboratory's Starfire Optical Range *Spring 2016*

Students toured research facilities at the Starfire Optical Range (SOR), at the Air Force Research Laboratory (AFRL) with scientists. The SOR operates one of the world's premier adaptive-optics telescopes capable of tracking low-earth orbiting satellites.

Faculty/Partner: AFRL Scientists



Make Smart-phones Smarter: Design an App *Spring 2016*

This project introduced students to foundational concepts related to designing smart-phone apps. Some of the tasks included were learning what types of information smart-phones can collect and utilize, conducting preliminary market analysis for an app and exploring funding options for app development.

Faculty/Partner: Jeff Hertz Department of Architecture & Planning UNM



Tour the Trinity Site: Experience the Birth of the Atomic Age *Spring 2016*

Students learned about the science and history behind the Manhattan Project, a series of events leading to the development of the atomic bomb; scientific pioneers involved in the project; and the bomb's detonation at the Trinity Site in southern NM.

Faculty/Partner: Dr. Luis Campos Department of History UNM



Up Close & Personal with 3D Technology: Scanning, Virtual Reality, and Printing *Spring 2016*

This project exposed students to 3D applications in forensic science. Students worked in Dr. Edgar's lab for a hands-on experience in scanning a carpal bone for a 3D image as part of a mock forensic case. Students then toured 3D Proven Systems for an up close and personal experience with 3D printing technology, scanning and software to gain a broader understanding of the technology's application in various fields and industries.

Faculty/Partner: Dr. Heather J.H. Edgar Department of Anthropology UNM Jon Maxwell 3D Proven Systems



Get Published Now *Spring 2016*

This 10 week course provided students with an understanding of the research process inclusive of identifying periodicals.

Faculty/Partner: Dr. Katie Denton, Callie French Center for Academic Program Support (CAPS) UNM



Grand Canyon Expedition: Through the Eyes of Nature *Spring 2016*

Dr. Crossey and Dr. Karlstrom led the prep session focused on their research in the Grand Canyon and provided students with an overview of the canyon's various rock formations and time frames.

*Faculty/Partner: Dr. Laura J. Crossey,
Dr. Karl E. Karlstrom* Department of Earth & Planetary
Sciences UNM



Wind & Solar Energy: Tour UNM Labs & North American Wind Research Cntr in Tucumcari *Spring 2016*

Students were exposed to a prep session focused on solar energy, and were led on a tour of the labs by Dr. Poroseva and her graduate students. The field trip to the North American Wind Research Center at Mesalands Community College in Tucumcari, NM, consisted of students learning about wind and solar technology.

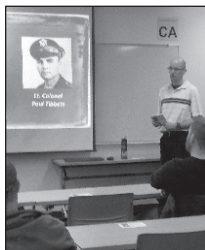
Faculty/Partner: Dr. Svetlana Poroseva
Department of Mechanical Engineering UNM



Shake It Up in Engineering: Shake Table, Sensing Technology & Website Creation *Spring 2016*

This project focused on developing a WordPress website to create remote access to simple engineering experiments and concepts that included a shake table and sensing technology. This project introduced students to simple engineering experiments and foundational concepts related to designing a website using WordPress. The final outcome was a professional website which served as a platform to display ideas and the work done by the Smart Infrastructure of Management Laboratory (SMILab) of the Civil Engineering Department at UNM.

*Faculty/Partner: Dr. Fernando Moreu, Dr. Ali Ozdagli,
Shreya Vemuganti* Department of Civil Engineering
UNM



Army Air Corps 509 Composite Group & Manhattan Project: A Sleeping Giant Awakens *Spring 2016*

Students explored the Manhattan Project from the perspective of the Army Air Corps 509 Composite Group, a U.S. Army Air Force Unit tasked with operational deployment of nuclear weapons during World War II, and got insight into the groups' role.

Faculty/Partner: Brian Vineyard College of Arts &
Sciences UNM



Walking Tour #1 UNM Maps Library MAGIC *Spring 2016*

The Walking Tour series was an opportunity to gain exposure to different groups, libraries, labs, and programs in order for students to get the fullest out of their university experience. On this tour, students explored the UNM Maps Library, MAGIC, and were given a tour of Zimmerman library.

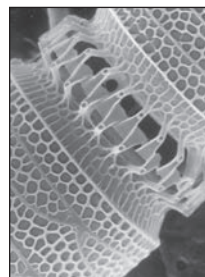
Faculty/Partner: Jazmyn Crosby AmeriCorps VISTA



Diverse Families in STEM Dialogue *Spring 2016*

An informal session with leaders in STEM was held to talk about how their family, work, and school life intertwine. This was a great group of graduate students, researchers, and professionals who have families and are pursuing a STEM education or career.

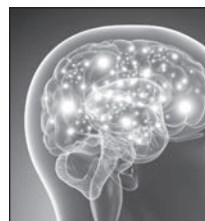
Faculty/Partner: Multiple STEM leaders



Can't Touch This: The Role of Chemistry in Nanotechnology *Spring 2016*

Students learned how Sandians at the Advanced Materials Lab are using chemistry to advance nanotechnologies. Dr. Bernadette Hernandez-Sanchez shared her career journey in STEM and her current nanotechnology research, and brought nanoscience kits to the lesson.

Faculty/Partner: Dr. Bernadette Hernandez-Sanchez
Advanced Materials Lab UNM



This is Your Brain on Neuroscience *Spring 2016*

Students listened to three neuroscientists, to hear how they got interested in the field and about their current neuroscience research. There was a diverse lineup of speakers, including undergraduate, graduate, and faculty researchers.

Faculty/Partner: Dakarai McCoy, Dr. Kevin Caldwell
Department of Neuroscience UNM



Playing the Research Game: Finding a Faculty Research Mentor *Spring 2016*

At this Shared Knowledge Conference, freshmen researchers shared their experiences about getting involved in research as first-year students and finding a faculty research mentor. They discussed their challenges in finding and working with faculty mentors, as well as the strategies that they used to confront these challenges.

*Faculty/Partner: First-Year Research
Experience students* UNM





The Walls Are Alive! What Can We Learn From NM's Lava Caves? *Spring 2016*

Students attended a short hour-long session about the role of New Mexico in lava caves research.

Faculty/Partner: Dr. Diana Northrup, Nicole Caimi, Adrienne Hubbard, Jennifer Hathaway
Department of Biology UNM



Explore INTEL New Mexico: A tour of INTEL in Rio Rancho *Spring 2016*

On this tour, students were exposed to emerging technologies, immersed in dialogue with INTEL scientists and were linked to required education, skills and experience to internship and career opportunities in various STEM fields.

Faculty/Partner: Ronald D. Eppes INTEL, New Mexico



Reconstructing Ice Age New Mexico: Archaeological Dig *Spring 2016*

Participants of this trip learned about methods for examining the ancient landscape through geoarchaeology using soil science and land form morphology within the Jornada del Muerto.

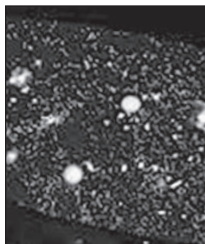
Faculty/Partner: Chris Merriman Department of Anthropology UNM



Walking Tour #2 Museum of Southwestern Biology *Spring 2016*

The Walking Tour series was an opportunity to gain exposure to different groups, libraries, labs, and programs in order for students to get the most out of their university experience. This tour students explored the Museum of Southwestern Biology, and were given a tour of their collections.

Faculty/Partner: Jazmyn Crosby AmeriCorps VISTA



Preparing the Next Generation of Astronomers in a Portable Planetarium *Spring 2016*

Students learned about constellations in the night sky and how to operate a portable, 25 foot wide planetarium with Judy Stanley. Activities included researching stars in the Orion constellation, viewing the night sky in the portable planetarium, and a discussing your experiences in college.

Faculty/Partner: Judy Stanley Very Large Array (VLA)



Donut Days *Spring 2016*

A mixer for all UNM students, staff, faculty and various members of the local Albuquerque science and engineering community.



Introduction to Business Start-Up *Spring 2016*

Students learned about the communication process connected with new business ventures, public speaking, communicating business ideas to the general public and investors effectively, and how to utilize the "A.B.O.U.T. Them" model of communication.

Faculty/Partner: Gavin Leach Department of Communication and Journalism UNM



Cyanotype Workshop : Science and Photography *Spring 2016*

In this workshop, Michael Gomez guided students through the cyanotype process. Students were provided with a background in the chemistry involved with the photographic process as well as an understanding and appreciation for the medium.

Faculty/Partner: Jazmyn Crosby AmeriCorps VISTA, Michael Gomez Department of Art & Art History UNM



Santa Fe STEM + Art Trip To Meow Wolf

Summer 2016

Students traveled to Santa Fe to view the Mouse In The Machine exhibition at the Thoma Foundation. Afterwards, they experienced the immersive Meow Wolf exhibit. A tour of the makers space at Meow Wolf was held, where students learned about the tools that make their exhibition possible.

Faculty/Partner: Jazmyn Crosby AmeriCorps VISTA Andrea Polli Department of Art & Art History UNM



Launchpad New Mexico: Tour Spaceport America-Home of Virgin Galactic *Summer 2016*

Students traveled to Spaceport America to learn about the latest technology within the space industry, and got an up-close look at the world's first commercial spaceport located in southern New Mexico.

Faculty/Partner: Spaceport America, Tim Schroeder STEM Collaborative Center UNM



Field Parasitology and Museums:

A Day in the Life of a Parasite *Summer 2016*

Students were introduced to ecosystems, the role of snails for parasitology research, and lab protocol. Students took a trip to the Rio Grande Nature Center to collect snails and worked in the lab to gain hands-on experience in research and cataloging data.

Faculty/Partner: Dr. Sara Brant Department of Biology UNM



Exploring Careers in the Health Professions

Summer 2016

Students participated in a series of 8 sessions to learn about opportunities available in various health professions and program admission requirements at UNM.

Faculty/Partner: **Dr. James McKinnell**

Department of Pediatrics UNM



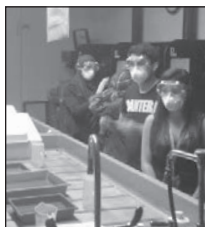
Science and Serendipity: The Recovery of Cacao in Chaco Canyon

Summer 2016

Students participated in a research talk from Dr. Patricia Crown, UNM's Distinguished Professor of Anthropology. They then conducted a hands-on seriation exercise, which is a method archaeologists use to determine the date of recovered artifacts.

Faculty/Partner: **Dr. Patricia L. Crown**

Department of Anthropology UNM



Tintype Workshop : Photography and Science

Summer 2016

Students learned about the history and process of tintype, a photographic process imploring a direct positive on a thin sheet of metal; followed by a hands-on workshop.

Faculty/Partner: **Aziza Murray**

Department of Art & Art History UNM



Proactive Planning: Applying for a Program in the Health Professions

Summer 2016

Students participated in a series of sessions designed to help them understand both the process and the skills that they need to develop in order to maximize their chances of success in a health profession or career.

Faculty/Partner: **Dr. James McKinnell** Office of

Pre-Health Professions Student Development UNM



Drones and 3D: Filming Aerial Views in Angel Peak Scenic Area in New Mexico

Summer 2016

Students learned the basic skills of connecting 3D-3600 camera systems and quadcopter drones to produce a short 3D video that provides an immersive experience to viewers. This event included a one day field trip to fly quadcopter drones, equipped with a 360-degree camera, to capture aerial views.

Faculty/Partner: **Craig J. Kief, Brian Zufelt** Configurable Space Microsystems Innovations and Applications Center (COSMIAC) UNM



Cutting Edge Sustainability: UNM At Los Alamos

Summer 2016

Students traveled to the New Mexico Consortium Lab in Los Alamos, and toured the Bio Lab and the PRObe Computing Center to learn more about their exciting research.

Faculty/Partner: **New Mexico Consortium Lab**



Discover Your Science Day

Fall 2016

Discover Your Science was an opportunity for students to learn more about science majors, research projects, cutting-edge technology, student organizations and student support programs at the UNM. It's a celebration of science, an introduction to new friends, and a jump-start on planning their science career. During DYS, they met professors, undergraduate and graduate students, and other individuals who will be important to their future success.

Faculty/Partner: Various



Explore the ancient World of Chaco Canyon & Discover Your Inner Archeologist!

Fall 2016

Dr. Wills presented his research on Chaco Canyon to students. He then led them on a tour of Chaco Canyon where he and his students conducted field research.

Faculty/Partner: **Dr. Wirt Wills** Department of Anthropology UNM

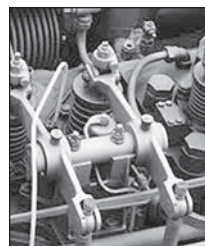


Robotics and Future Swarms: Tour of Multi-Agent, Robotics, Hybrid and Embedded Systems (MARHES) Laboratory

Fall 2016

MARHES Lab student employees presented Dr. Fierro's research and how the technology is used in world applications. Students were given demonstrations of the swarm robotics, drones and unmanned vehicles that communicated with each other through communications systems. Students also interacted with the BAXTER robots, large robots used in manufacturing production lines.

Faculty/Partner: **Dr. Rafael Fierro** Department of Electrical and Computer Engineering UNM



Zoom Zoom! Help Build UNM's 2016-17 Formula SAE Race Car

Fall 2016

Students attended a prep session with the race car team focused on the build phase of the car. Students attended ME classes for the remainder of the semester and participated in helping to fabricate, repair, and test-drive the Formula SAE Race Car.

Faculty/Partner: **Dr. John Russell** Department of Mechanical Engineering UNM



Walking Tour: The Trees of UNM Fall 2016

Students were lead us on a walking tour of UNM campus, and learned about the amazing trees and plants on the university campus.

*Faculty/Partner: **Timothy K. Lowery** Herbarium at the Museum of Southwestern Biology UNM*



FUSE Makers Space Trip Fall 2016

Students took a trip to the CNM campus, to get an in-depth tour of the FUSE Makerspace. FUSE is a fabrications lab and community center which provides tools for participants to design, prototype, and create manufactured work.

*Faculty/Partner: **Andrea Polli** Department of Art & Art History UNM **Matt Barbato** Fuse Makers Space*



The Creeping Garden Screening at the Guild Cinema Fall 2016

Students took a field trip to the Guild Cinema, for a screening of The Creeping Garden. This 2014 British documentary interviews scientists and artists, and discuss their interest in slime mold. After the film, a Q&A session was held with students, the filmmakers (via Skype), professor Bruce T. Milne and artist Russell Bauer.

*Faculty/Partner: **The Guild Cinema, Tim Graham** and **Jasper Sharp** Filmmakers, **Bruce T. Milne** Department of Biology **Russell Bauer** Albuquerque Artist*



Health Care Career Day at the UNM Health Science Center Fall 2016

On this trip to UNM's north campus Health Science Center (HSC), students got to interact with HSC students and faculty. Plus, they were able to take tours of medical laboratories, such as Nursing, Medical Laboratories Sciences, Pharmacy, Radiology, and Brain Scans.

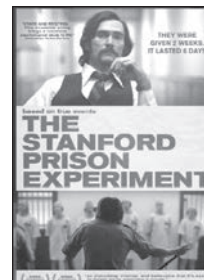
*Faculty/Partner: **El Centro de la Raza UNM, Health Sciences Center Office of Diversity UNM, Office of Pre-Health Professions Student Development UNM***



Apocalyptic Radio Transmitter Building Workshop Fall 2016

Using nine electronic components, solder, wire, and copper, each workshop attendee built a small unit that was tuned to emit various carrier wave lengths in the FM spectrum, and joined with audio signals for short range broadcast.

*Faculty/Partner: **Lee Montgomery** Electronic Arts UNM*



Examining the Ethics of Human Research with the Stanford Prison Experiment Film Fall 2016

Students learned about the study and ethical implications resulting from this real life experiment by screening the film "The Stanford Prison Experiment". The screening was accompanied by an introduction from an expert in human subjects' research, Dr. Teddy Warner, as well as a Q & A.

*Faculty/Partner: **Dr. Teddy Warner** Family and Community Medicine UNM*



Bio Exploration Day! Fall 2016

At this one-hour session, students learned about all the opportunities given to them as an undergraduate student in biology, and talked to a biology student who has already gone through the process.

*Faculty/Partner: **Doris Zhang, Mercedes Metzger** Department of Biology*



Playing with Water: Water Day at UNM Fall 2016

Students participated in 5 hands-on activities and toured the Hydraulics Lab where they created dams to see the reaction of the water and interacted with CWE faculty and graduate students via research posters.

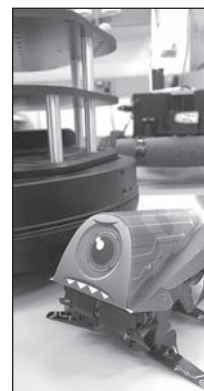
*Faculty/Partner: **Dr. Vanessa Valentin** Department of Civil Engineering*



EPIC Donut Day: A science and engineering mixer Fall 2016

A mixer for all UNM students, staff, faculty and various members of the local Albuquerque science and engineering community.

2017



Robotics at UNM II: Tour of Multi-Agent, Robotics, Hybrid, and Embedded Systems (MARHES) Lab Spring 2017

Tour of Dr. Rafael's MARHES Lab in ECE L217. Lab student employees presented Dr. Fierro's research and how the technology is used in world applications. Students were given demonstrations of the swarm robotics, drones and unmanned vehicles that communicated with each other through communications systems being developed by Dr. Fierro. Students also interacted with the BAXTER robots, large robots used in manufacturing production lines.

*Faculty/Partner: **Dr. Rafael Fierro** Department of Electrical and Computer Engineering*



Curriculum Development for Google Grant

Spring & Summer 2017

Tara Hackel collaborated with undergraduate students and the College Preparatory Program to develop curriculum to guide Moriarty High School students through developing a novel research question and presenting a research poster

Faculty/Partner: Jenn Wilson & Stacy Collier, College Preparatory Programs,



Designer Strawberries: Extracting DNA and exploring biotech careers

Spring 2017
Undergraduate student researchers, who use the DNA editing technology (CRISPR), spoke with undergraduates about how CRISPR is used in today's research community. Plus, they got some hands-on experience extracting DNA from strawberries.

Faculty/Partner: Dr. Paul Durfee SACNAS Lobos UNM



Life in 3D: 3D Printing Workshop

Spring 2017
Students learned about the fundamentals of 3D printing; including software types, equipment, and a live demonstration at the Center for Advance Research Computing (CARC)

Faculty/Partner: Matt Barbato Social Media Workgroup



TechCon 2017

Spring 2017
TechCon 2017, held in the SUB Ballrooms, gave students hands-on experience with current and upcoming technologies. They were also given the opportunity to tour various technology centers on campus.

Faculty/Partner: Center for Stable Isotopes UNM, Southwest Environmental Science Center UNM, VJBK Visual/Audio Artist, various technology exhibitors and UNM resource representatives



Creating Your Realities: An Augmented Reality Workshop

Spring 2017
Students learned about ARIS, a user-friendly, open-source platform for creating and playing mobile games, tours and interactive stories. Using GPS and QR codes, students were shown how to create layers of story, science, art and history, using ARIS.

Faculty/Partner: Chris Holden ARIS Designer



Tour of Air Force Research Laboratory

Spring 2017
Students learned about internships and careers at the AFRL. AFRL Scientists led students on tours of various laboratory facilities, including an anechoic chamber (one of the largest in the Air Force), lasers, and optics.

Faculty/Partner: AFRL Scientists and Engineers



Evolution of Indigenous Architecture:

Explore Chaco Canyon Spring 2017

At the prep session, students were exposed to the research being conducted by Dr. Jojola and information on indigenous perspectives in design along with a history of pueblo architecture. The field trip to Chaco Canyon was canceled due to inclement weather and rescheduled for Fall 2017.

Faculty/Partner: Dr. Ted Jojola School of Architecture UNM, Indigenous Design and Planning Institute



Water Utility Mapping Academy

Spring 2017
This workshop series introduced students to asset data collection and GIS mapping, and provided them with the preliminary skills for creating a small water utility map. This workshop series was hosted by the Southwest Environmental Finance Center.

Faculty/Partner: Teresa Gomez Environmental Engineering UNM, Mark Ogrentz Southwest Environmental Finance Center UNM



Discovering an Empire in Chile's Atacama Desert

Spring 2017

On a trip to Tesuque Pueblo Farm, Dr. Hayashida presented her research conducted in Chile's Atacama Desert where farmers utilize limited water resources growing varieties of maize, quinoa and potatoes.

Faculty/Partner: Dr. Frances Hayashida Department of Anthropology



Playing with Fire

Spring 2017
Playing with Fire was a workshop that explored playful ways to control heat and fire with electronics. Students built circuits that could melt and burn items, while writing simple programs to control them using Arduinos.

Faculty/Partner: Leah Buechley MIT Media Lab



Drones: Using Technology to Create Mixed Realities

Spring 2017

Students attended 3 class sessions to learn about the software and technology connected to drones and use of the 3D camera for filming. Students took a field trip to fly the drones and film.

Faculty/Partner: Craig J. Kief, Brian Zufelt Configurable Space Microsystems Innovations and Applications Center (COSMIAC) UNM, Jeff Love Graduate Student UNM





Creative Design Workshop *Spring 2017*

The Creative Design Workshop was an opportunity for students to learn the fundamentals of Adobe Creative Cloud. Students gained knowledge to create dynamic visuals for both print and web application as well as presentation. The Workshop walked through creating visuals in Photoshop, Adobe Illustrator, InDesign, and learn how to present them in Microsoft Powerpoint and Apple Keynote.

Faculty/Partner: Jon Sanchez STEM Collaborative Center UNM Britney King AmeriCorps VISTA



Quinoa: Quandary & Reign in Bolivian Andes by Dr. Marygold Walsh-Dilley *Spring 2017*

Dr. Marygold Walsh-Dilley presented her research on farmers growing quinoa in the Bolivian Andes, an ancient and traditional crop, and its political and socioeconomic impact on the traditional farmers in Bolivia per quinoa being grown in the U.S.

Faculty/Partner: Dr. Marygold Walsh-Dilley Honors College UNM



The Secret Lives of Rivers in the Valles Caldera National Preserve *Spring 2017*

On a trip to Valles Caldera, students spent a day discovering the life beneath the flowing waters. They learned about the health of the streams through benthic sampling, in which screens are used to filter and count the living things in the stream bed. Distinguished Professor Dr. Reed Perkins introduced them to a variety of animals and plants that call the stream bed home.

Faculty/Partner: Dr. Reed Perkins Valles Caldera



Women in STEM: Let's Talk Success! *Spring 2017*

These women, 1 graduate and 2 undergraduate students sat on a panel to share their personal stories as a woman pursuing a STEM field of study and working in a STEM field of study. They spent one-on-one time with students and held a Q & A session.

Faculty/Partner: Dr. Corinne Myers, Dr. Maya Elrick Department of Earth & Planetary Science UNM Dr. Lisa N. Barrow Department of Biology UNM Barbara Lopez - PNM Resources, New Mexico Technology Council, Domestic Violence Resource Center, Media Arts Collaborative Charter School Nyika Allen New Mexico Technology Council, Fox New Mexico, Nyika Media, Girl Develop It ABQ



Epic Donut Days *Spring 2017*

A mixer for all UNM students, staff, faculty and various members of the local Albuquerque science and engineering community.



Coming Clean with Water: Tour ABQ Wastewater Reclamation Plant & Water Quality Lab *Spring 2017*

On this trip, students took a tour of Albuquerque's Southside Wastewater Reclamation Plant (SWRP) and Water Quality Lab. They followed the path of the wastewater as it is cleaned to the banks of the Rio Grande, where cleaned water is released into the river. After the plant tour, they visited the Water Quality Laboratory.

Faculty/Partner: Erin Keck, Nancy Andryszak, Southside Wastewater Reclamation Plant (SWRP)



Sharing Your College Knowledge with Moriarty High School Students *Spring 2017*

Teaming up with College Prep Programs, high school students from Moriarty were brought to UNM to visit with undergraduate mentors. The valuable experience of the mentors helped them understand the challenges and rewards that lay ahead.

Faculty/Partner: Career Services UNM, Undergraduate Mentors UNM



UNM Solar Photovoltaic Building Tour *Summer 2017*

On this walking tour, students got a behind the scenes look at how solar panel technology works. They learned how much it takes to power a light bulb, found out some secrets about renewable energy, and visited many rooftop solar panels on campus.

Faculty/Partner: Hans Barsun Physical Plant Department UNM



Paleontology Portal into Time and Space *Summer 2017*

The prep session was a hands-on activity where students explored the Paleobiology Database to see how fossil collections are used. Students used the map application and selected fossils to see where they have been collected all around the world. Students reconstructed tectonic plate positions at various times in Earth's history and reviewed the website for basics on the Cretaceous Period. This session was followed by a Tour of the Fossil Collections and the Fossil Prep Lab where students were able to handle fossils.

Faculty/Partner: Dr. Corinne Myers Department of Earth & Planetary Sciences



Summer Student Innovation Showcase - Summer 2017
This short session exposed students to various projects that other UNM students on campus were working on, as well as showing them how to develop their own projects. Scientists and researchers were available to talk to.
*Faculty/Partner: **Student Researchers***



Left-Over Extraterrestrials: The Story of Meteorites Summer 2017
Instructors from the Institute of Meteoritics in the Department of Earth & Planetary Sciences led a prep session hands-on activity, where students handled meteorites, learned about their chemical make-up based on color, texture, weight and galaxy origin. This was followed by a Tour of the labs, and Meteoritic and Geology Museums.
*Faculty/Partner: **Dr. Horton Newsom, Dr. Steven Simon** Department of Earth & Planetary Sciences*



Wonders of the Universe: Tour the Very Large Array Summer 2017
In the prep session, Peter shared Dr. Pihlstrom's research and how they use the technology at the VLA. Students then took a field trip and toured the VLA, where they got a behind-the-scenes look into the observation room to learn about the radio antennas.
*Faculty/Partner: **Peter Sinclair** Department of Physics and Astronomy UNM **Dr. Ylva Pihlstrom** Department of Physics and Astronomy UNM, Center for Astrophysical Research and Technologies (CART)*



Fourth State of Matter, Pulsed Power & Intense Microwaves! Summer 2017
On a tour of Dr. Gilmore's Fusion and Plasma Science Laboratory and Dr. Edl Schamiloglu's Pulsed Power, Beams and Microwaves Laboratory, professors shared their research with students. They also discussed their work with Los Alamos, Sandia and AFRL; and invited students to talk to them about working in their labs this fall (paid positions).
*Faculty/Partner: **Dr. Mark Gilmore, Dr. Dustin Fisher** Department of Electrical and Computer Engineering UNM, **Dr. Edl Schamiloglu** Configurable Space Microsystems Innovations and Applications Center (COSMIAC) UNM*



Discover Your Science Day 2017 Fall 2017
Discover Your Science was an opportunity for students to learn more about science majors, research projects, cutting-edge technology, student organizations and student support programs at the UNM. It is a celebration of science, an introduction to new friends, and a jump-start on planning their science career. During the Discover Your Science, they met professors, undergraduate and graduate students, and other individuals who will be important to their future success.
*Faculty/Partner: **Various***



Free STEM Movie Night: The Martian Fall 2017
Students were treated to a free screening of The Martian (extended cut) at the The ASUNM Southwest Film Center. Popcorn and refreshments were provided.
*Faculty/Partner: **ASUNM Southwest Film Center***



Caving at El Malpais National Monument Fall 2107
In the prep session, students were exposed to research and the activities they will conduct in regard to collecting specimens from the cave and dirt from the top of a specific hill. Dr. Northup showed students how to collect the specimens and real-world applications of her research. Students from Dr. Northup's FLC and STEM U students did both caving and hiking activities at Xenolith Cave on the field trip to El Malpais.
*Faculty/Partner: **Dr. Diana Northrup** Department of Biology UNM, Freshmen Learning Community UNM*



Playing with Water: Water Day at UNM Fall 2107
Students participated in 5 hands-on activities and toured the Hydraulics Lab where they created dams to see the reaction of the water. Students interacted with CWE faculty and graduate students via research posters, engaging in dialogue.
*Faculty/Partner: **Dr. Vanessa Valentin** Department of Civil Engineering UNM, Center for Water and the Environment UNM, **Blade Montgomery** Department of Civil Engineering UNM*



STEM Career Fair 101 Fall 2017
This workshop was specifically designed for freshmen, sophomores, and first-time career fair attendees. Students learned helpful tips and strategies to get the most of the UNM Science and Engineering Career Fair.
*Faculty/Partner: **Shalom Bond** Career Services UNM*



Discover the Cosmos: Tour the Very Large Array!

Fall 2017

In the prep session, Peter shared Dr. Pihlstrom's research and its link to the technology at the VLA. Students toured the VLA where they received a behind-the-scenes look into the observation room, to learn about the radio antennas and type of research supported by the antennas.

Faculty/Partner: **Peter Sinclair** Department of Physics and Astronomy **Dr. Ylva Pihlstrom** Department of Physics and Astronomy, Center for Astrophysical Research and Technologies (CART)

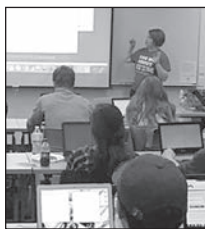


Radiation Science: Tour the Nuclear Weapons Instructional Museum at Kirtland

Fall 2017

At this event, students learned basic radiation science through the Defense Nuclear Weapons School, part of the Defense Threat Reduction Agency (DTRA), located at Kirtland Air Force Base. They also toured the Nuclear Weapons Instructional Museum (NWIM), the only such classified Museum in the Department of Defense.

Faculty/Partner: **Captain Brad Jones**, **Major Bruce Hill** United States Air Force (USAF)



Coding with Python: The Snake Game

Fall 2017

In this session, Ashley created a snake game using Python code. She walked students through a basic introduction to Python coding and had students create modifications to the game. Dr. Fricke provided computer science information to students.

Faculty/Partner: **Ashley Mayle**, **Dr. G. Matthew Fricke** Department of Computer Science UNM



Cultura y las Ciencias: A resource fair about integrating culture into research

Fall 2017

Students attended this exciting resource fair about the new field of cultural neuroscience. Researchers and students shared their insight about how to address culture in research as well as discuss pathways for becoming a researcher early in their undergraduate career.

Faculty/Partner: **Dr. Benjamin Clark** Department of Psychology UNM, **Glenda Lewis** Language, Literacy, and Sociocultural Studies UNM, **Dr. Claudia Tesche** Department of Psychology UNM, **Selene Concepcion Vences-Ortiz** Department of Psychology UNM, **Dr. Steven Verney** Robert Wood Johnson Foundation Center for Health Policy UNM



Evolution of Indigenous Architecture: Explore Chaco Canyon

Fall 2017

At the prep session, students were exposed to indigenous perspectives in design along with a history of pueblo architecture. At Chaco Canyon, students were provided an in-depth view of structures and their relevance to Chaco cultural life.

Faculty/Partner: **Dr. Ted Jojola** School of Architecture UNM, Indigenous Design and Planning Institute.



Lean in for Women in STEM: Creating an Inclusive Culture for Learning and Opportunity

Fall 2017

Students participated in discussions on topics related to academic progress, overcoming challenges and barriers, work-life balance, and identities in STEM.

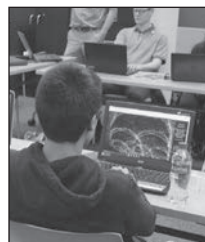
Faculty/Partner: **Dr. Vanessa Valentin** Department of Civil Engineering UNM, **Joan Green** Accessibility Resource Center UNM, **Callie French** STEM, CAPS, **Tara Hackel** STEM Collaborative Center, **Dr. Corinne Myers** Department of Earth & Planetary Sciences, **Bernadette Gallegos** and **Anju Shah** Sandia Women's Action Network, **Steve Peralta** Department of Engineering Student Services UNM, **Jessica Holland** Women's Resource Center UNM, **Paulina Przystupa** Department of Anthropology UNM, **Meagan Myers**, **Danielle Gilliam** Global Education Initiatives, **Frankie Flores** LGBTQ Resource Center UNM, **Amelia Villaseñor** Department of Biology UNM, **Armando Bustamante** El Centro de la Raza UNM, **Carli Maldonado** Career Services UNM, **Kelly Cockrell** Department of Engineering, **Caitlin Henk** Women's Resource Center UNM, **Dr. Laura Crossey** Department of Earth and Planetary Sciences



EPIC Donut Day: A science and engineering mixer

Fall 2017

A mixer for all UNM students, staff, faculty and various members of the local Albuquerque science and engineering community.



Designing Chaos: A Fractal Experience

Fall 2017

Students learned more about fractals and their infinitely complex patterns, which are self-similar across different scales and created by repeating a simple process in an ongoing feedback loop. They created their own fractal in this interactive workshop lead by instructor Joel Castellanos.

Faculty/Partner: **Joel Castellanos** Department of Computer Science, UNM



STEM UNIVERSITY MENTORING PROGRAMS

Fall 2015 - Spring 2018



United Scholars Research

Mentoring Program Spring 2018

Tara Hackel collaborated with a team of undergraduate students to develop a research exploration program that pairs a UNM first-year undergraduate student who is curious about research with an experienced UNM undergraduate student researcher. Through structured and informal activities, the experienced student researcher supports the early undergraduate student in preparing to present a research poster at UNM's Undergraduate Research Opportunity Conference (UROC).

UNM Undergraduate Mentoring Team:

Bryan Rubio-Perez, Dylan Brown, Denise Cano, Lorenza Friedrich, Nalleli Reyes Garcia, Mercedes Metzgar, Selene Vences-Ortiz



UNM STEM Mentoring Program

Fall 2015 - Spring 2018

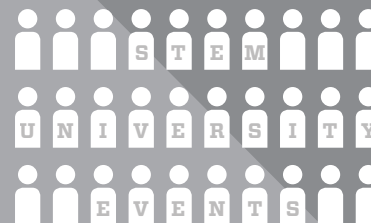
The UNM STEM Mentoring Program helps UNM undergraduate students build a supportive relationship with a scientist or engineer from Air Force Research Laboratory (AFRL) or Sandia National Laboratories (SNL). Students and mentors work on a specific goal during the semester such as exploring different majors or STEM fields, applying for internships, getting involved in research, meeting other scientists and engineers, and more. Many students stay involved with the program for multiple semesters and even become mentors for first-year undergraduates through the program.

Faculty/Partner: **Air Force Research Laboratory, Sandia National Laboratories**



STEM UNIVERSITY

BY THE NUMBERS



1,670

undergraduates participated in **STEM U** events between Spring 2015 & Fall 2017



74
students participated in
**Air Force Research
Laboratory (AFRL)/
Sandia National Laboratories**
mentorships



114

participated in **Discover Your Science Days**



✓482

participated in
**New Student Orientation
Opt-In Day**
(Intro to Undergraduate Research)

665

participated in
**High-Engagement
Co-Curricular
STEM Events**



STEM UNIVERSITY

BY THE NUMBERS

Participants

Non-Participants

NSO Opt-In with CEP

89%

2nd Semester
Enrollment Rate

72%

3.21

Cumulative UNM GPA

3.11

High-Engagement Co-Curricular STEM Events

3.33

Cumulative UNM GPA

3.17

AFRL/Sandia Labs Mentoring

3.31

Cumulative UNM GPA

3.14

Discover Your Science

88%

Fall 16 to Fall 17 Return Rate

71%

94%

Fall 17 to Spring 18 Return
Rate

85%

3.40

Cumulative UNM GPA

3.20



Wonders of the Universe: Tour the Very Large Array, Summer 2017



Discover Your Science Day, Fall 2017



Santa Fe STEM + Art Trip To Meow Wolf, Summer 2016





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