TESTED AND PROVEN

Transforming Students’ Lives and Our Communities through Research, Scholarship, and Creative Activity
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Research, scholarship, and creative activity touch every part of the California State University—enhancing student learning, engaging students in their own success, and preparing students for the demands of the future. Faculty renew knowledge in their fields, with direct benefit to students and society. Staff members support faculty and students as they advance research on campuses and in their communities.

The breadth and depth of this work is demonstrated in the projects selected for this publication. The first section will address the ways we harness the power of 23 campuses through shared expertise, initiatives, facilities, and resources. Particularly, we will address shared contributions in the following fields:

- Agriculture and Water Resources
- Biotechnology
- Coast and Ocean
- Desert Studies
- Palliative Care
- Social Science

The second section describes dozens of projects across all 23 campuses. Taken together, these projects demonstrate the connections forged on a local, regional, statewide, national, and global scale.

Research, scholarship, and creative activity are intrinsic to the CSU. This is a noble work that advances the CSU’s public mission; and our work continues.
Teaching, research, scholarship, and creative activity are the pillars of quality degree programs. Students are highly encouraged to engage in research and other scholarly, creative activities in order to learn teamwork and critical problem solving. Faculty must remain active contributors in their fields of expertise in order to provide our students with a solid academic foundation.

At its core, education is inseparable from the pursuit of new knowledge. The educational experience is one of constant testing, of pushing the boundary between what we believe and what we know. That testing goes far beyond the confines of a classroom. We test our hypotheses in laboratories on every California State University campus. We test our hypotheses in every region and community we serve. We test our hypotheses in our own careers and lives.

We, as a people, thirst for the knowledge that is gained through testing. We, as scholars, know that this thirst is unquenchable. Every discovery brings with it a new frontier. Knowing that the work of discovery will never end, it is our responsibility and privilege to prepare the next generation to continue on as researchers, artists, thinkers, performers, and scholars.

In the following pages, you will read about how CSU faculty and staff are harnessing their tremendous expertise to make immediate, consequential improvements for California and our global community. Importantly, our students are active participants in this work. In nearly every example cited in this publication, students are making meaningful contributions and sometimes—with appropriate mentoring and guidance—leading their own projects.

This publication may be read as a collection of tested and proven best practices for engaging students in their education. These projects thrive through the combination of sound pedagogy and a learn-by-doing attitude. The best way to seed a passion for tomorrow’s discoveries is to engage students in today’s discoveries. The best way to empower academic success is by engaging students in successful scholarship. Empowered and impassioned, our students will push the boundaries of human knowledge.

The first story of this publication is of Dr. Alejandro Briseno. His story exemplifies testing one’s mettle and proving one’s potential at the California State University. To Dr. Briseno, and all those who follow in his footsteps, I wish you a successful journey as you explore new frontiers. To the faculty and staff who mentor our students and alumni, I thank you for being exemplary role models and guides.

Sincerely,

Timothy P. White
Chancellor
There is perhaps no greater feeling than being in the laboratory, having just made a discovery—but being in the White House and meeting the President of the United States is a really close second. Honestly, I cannot imagine my life leading to either of those experiences without California State University, Los Angeles.

The path I was on as a child and young adult was difficult. I lost my father to the violence of an unsolved murder. My mother, lovingly, did everything in her power to raise me and my four siblings in a struggling neighborhood. She fought every day to give us a way out. I didn’t always make it easy for her and had my challenges in school, both before and after starting college. I was never one for learning abstract concepts. My grades often suffered as a result.

Fortunately, at Cal State LA, I found faculty—particularly Professor Feimeng Zhou—who made the world of organic chemistry real. He taught me how to build molecules one atom at a time. He worked with me to make devices and test functions, while studying chemicals, proteins, and diseases. Together, Dr. Zhou and I published 11 academic papers—while I was still an undergraduate.

The first in my family to attend and graduate from college, I am now a researcher and associate professor in the University of Massachusetts Department of Polymer Science and Engineering. And that meeting with President Obama, it was part of a ceremony for recipients of the Presidential Early Career Award for Scientists and Engineers.

It goes without saying that I would have never had that moment in the White House if not for the tenacious strength of my mother and the patient guidance of Dr. Zhou.

That is my California State University story: faculty mentors who taught and inspired me, colleagues and friends who encouraged me, staff members and administrators who ensured I had the financial resources to stay in school, and family that loved and supported me. You hear the praise at commencement for the community that leads to student success. That community is real. Its presence is felt every day by students. As alumni, we carry it with us.

In the CSU community, faculty engage students—undergraduates and graduates—directly in their research and scholarly activity. You have the opportunity to be in the laboratory, solving challenges and making discoveries. A CSU student is an active participant rather than a passive observer. Faculty are invested in the success of the students, and students are invested in the success of the work. This shared commitment is what defines a successful community. This is the legacy I plan to continue with the young scientists now under my care.

Thank you, to Dr. Zhou and all his California State University colleagues, for sharing in your successes and empowering the successes of all your students.
As much of the American West experiences prolonged periods of drought, the study of water, agriculture, and the interconnection between the two is increasingly vital. The California State University continues to lead the state and nation in directed research of agriculture and water resources through the Agricultural Research Institute (ARI) and Water Resources and Policy Initiatives (WRPI).
COLLABORATION UNLOCKING ANSWERS

Collaboration is key to developing solutions to overcome California’s water and agricultural challenges. Estimated at over $50 billion per year, California is the leading agricultural producer in the United States—relying on the world-class research, analysis, and policy recommendations provided by the ARI and its six member campuses.

The ARI engages the collective expertise of CSU colleges of agriculture and other related programs across the CSU system, in partnerships with the University of California and US Department of Agriculture (USDA), to conduct research and facilitate technology transfer to improve the economic viability and sustainability of food production in the state.

WRPI faculty, staff, and student researchers and policy experts come from all 23 campuses in the CSU. Through its mission to prove academic preparation, applied research, and policy development related to water use, WRPI provides the necessary expertise to support California’s need for appropriate and sustainable water resources and policy.

SAVING DROPS FOR BETTER CROPS

- Researchers at Cal State Monterey Bay and Fresno State are developing a satellite-based system to gather data and metrics that can help better quantify how water efficiency strategies are working at various spatial scales in agriculture.

- In a partnership with the industry, researchers at Cal Poly San Luis Obispo are studying the irrigation practices of strawberry growers on California’s central coast. The goal is to challenge current sprinkler irrigation methods and introduce drip irrigation.

- Student and faculty researchers at Cal State San Bernardino tested various water filters to determine the most cost-effective method of removing arsenic, a commonly found contaminant in groundwater that has been found to cause cancer and skin lesions from long-term exposure.

- Cal Poly Pomona researchers are developing ways to improve the water-and-nitrogen-use efficiency of lettuce through traditional and molecular-aided breeding methods.

Nearly all ARI researchers hire, train, and engage students in the research process. Additionally, WRPI internships take place all over the state of California with various USDA agencies, giving students from all 23 CSU campuses as well as the California Community Colleges paid professional experience to augment their classroom learning.
SUPERB EDUCATION AND RESEARCH DRIVING BIOTECHNOLOGY INNOVATION

Biotechnology is a merging of fields. It joins biology with robotics, organic chemistry with engineering, nanotech with computer tech, and health applications with health administration. Biotechnology is uniquely suited to the concentration of expertise and ingenuity in California. This merging of talent is particularly well matched to the California State University.
MAKING ADVANCEMENTS TOGETHER

Through applications of biotechnology, CSU students, faculty, and staff are developing solutions to today’s and tomorrow’s environmental, economic, and health challenges. Across the university system, the CSU Program for Education and Research in Biotechnology (CSUPERB) supports development in this field. CSUPERB activities include:

- Advancing innovational educational practices
- Enhancing student and faculty research opportunities
- Encouraging entrepreneurship
- Promoting private-public partnerships
- Facilitating technology transfer activities

LOCAL DISCOVERIES, GLOBAL REACH

CSUPERB funding provides opportunities for students and faculty to undertake research projects as well as present their data to fellow scientists and industry experts. Exemplary CSU work can be found throughout the state. This research includes:

- Chris Ikeda, a master’s student at San Francisco State, is striving to better understand the climatic and environmental conditions that influence harmful algae blooms and toxicity.
- Dr. Rachel Mackelprang, assistant professor at CSU Northridge, uses DNA sequencing, bioinformatic analysis, and microbiology-based approaches to study the impact of climate change on the release of microbial communities locked in permafrost.
- Dr. Elizabeth Skovran, assistant professor at San José State, combines systems biology with classical genetic and biochemical techniques to engineer microbes that produce value-added chemicals like methanol and methane for biofuels and bioplastics.
- Dr. Carol Lauzon, professor at CSU East Bay, works with a team of students—alongside experts at the US Department of Agriculture—to rapidly and accurately detect and identify harmful E. coli bacteria in food samples.

As demonstrated, biotechnology touches on a wide range of issues with both immediate and long-term benefits for human health and the understanding of our environment. Working in some of the world’s most environmentally and economically productive regions, CSU students, faculty, and staff are making progress that is—in a word—superb.
THREE RESEARCH ARMS, ONE RESEARCH MISSION

The Moss Landing Marine Laboratories (MLML)—now in its fiftieth year—is a multi-campus consortium of marine science researchers, faculty and staff from CSU campuses in East Bay, Fresno, Monterey Bay, Sacramento, San Francisco, San José, and Stanislaus. MLML currently has nine faculty members in residence and offers a curriculum for approximately 100 CSU students—both graduate and undergraduate. MLML’s research capacity includes a 60,000 square foot laboratory, several research vessels, and a dive program.

The Ocean Studies Institute (OSI) is a collaboration of nine CSU campuses in Southern California offering members access to joint resources, support vessels, and a diving safety program for marine research. Founded in 1972,
OSI is now part of the Southern California Marine Institute, a joint research and resources partnership between the CSU, UCLA, University of Southern California and Occidental College.

The CSU Council on Ocean Affairs, Science and Technology (COAST) was established in 2008 to integrate systemwide resources and promote interdisciplinary multi-campus collaborations to advance knowledge of California’s natural coastal and marine resources and the processes affecting them. The council serves faculty and students engaged in marine, coastal, and coastal-watershed-related research at each of the CSU’s 23 campuses and supports research providing innovative solutions to economic, sociological, ecological, and technological challenges along our coast.

NEW DISCOVERIES PROTECT CALIFORNIA’S COAST

For MLML, OSI, and COAST, collaboration is the key to research success. MLML, OSI, and COAST offer rigorous directed research opportunities for CSU students, as well as prestigious internship opportunities with state and federal agencies, non-profit organizations, and major industries.

- MLML students are studying the effects of climate change on deep seafloor communities in the Antarctic using imagery collected by a remotely-operated vehicle—an ROV—that was designed built and operated at a MLML laboratory.
- The chemical oceanography lab at MLML recently completed its third year of a collaborative research program sponsored by the National Science Foundation to study the cycling of methylmercury—a bioaccumulative environmental toxicant—in marine advection fog.
- OSI faculty are using state-of-the-art marine animal tracking technology and techniques to monitor the return of the endangered giant sea bass, white sharks, and important gamefish following decades of overfishing.
- CSU students also have the opportunity to conduct directed research on Catalina Island through courses offered by OSI at the world-renowned Wrigley Marine Lab.
- COAST faculty researchers from San Diego State are studying the rate of photo-oxidation and degradation of oil following the Refugio oil spill in Santa Barbara County in May 2015. This work will determine changes in oil chemistry and associated toxicity during the degradation process.
- COAST faculty from Cal Poly San Luis Obispo, CSU Fresno and San Francisco State are collaborating to model the effect of multiple environmental stressors on marine organisms’ fitness and function.
The CSU Desert Studies Consortium is a collection of seven campuses—Dominguez Hills, Fullerton, Los Angeles, Long Beach, Pomona, and San Bernardino—and operates the CSU Desert Studies Center (DSC), located in the Mojave National Preserve in southeastern California. Nearly four decades old, the DSC continues to serve as a premier location and resource for research and education in geology, hydrology, and biology—among many other topic areas—of California’s desert and the American West.
IDEAL RESEARCH LOCATION

At the DSC, undergraduate and graduate research projects are coupled with multi-million dollar endeavors led by globally recognized scientists. Its location within a 1.5 million-acre national preserve allows for a sustainable, isolated, and protected research venue for long-term projects and studies on fragile ecosystems.

MANY SPECIALTIES, ONE HOME

The Desert Studies Consortium provides opportunities for CSU students, faculty, and staff to engage in unique research projects and develop deep connections between the harsh Mojave Desert environment and the people of California. This includes:

- Long-term projects are among the many specialties of the DSC. For the last two decades, professors from Cal Poly Pomona have studied the population dynamics of the Desert Holly, a silvery-gray and drought-tolerant shrub native to the area. The DSC is also overseeing the longest-known record of a reptile community in the Mojave Desert, led by DSC Director and Cal State Fullerton Professor Bill Presch.

- April Newlander, a graduate student from Cal State Fullerton, evaluated the impacts of surface-water diversion on desert plant spatial distributions and water use at the DSC. Her project, funded by a $70,000 grant from the USGS Priority Ecosystems program, engaged at least six other CSU students in her field and laboratory research—establishing the foundation for two additional student research projects. The project resulted in two peer-reviewed publications and ten presentations at national academic society meetings.

- The desert is a harsh environment for animals and their struggle for survival is the research focus of Dr. Rulon Clark from San Diego State. Funded by a $390,000 National Science Foundation grant, Dr. Clark and his students undertake research at the DSC on predator-prey interactions between small mammals and rattlesnakes. In total, 16 undergraduate students and four graduate students have been involved in the project. Some have also been supported by the DSC-administered Judith A. Presch Desert Research Award.

The successes of these studies, as well as more than 50 others over the past 10 years, rely on the infrastructure provided by the DSC and its cooperative agreement with the Mojave National Preserve.
INTEGRATING RESEARCH, OUTREACH, AND EDUCATION IN PALLIATIVE CARE

As the American population ages and rates of chronic and serious conditions rise, the study and application of palliative care is becoming a more frequent component of a patient’s care strategy.

Palliative care is an extra layer of support delivered by an interdisciplinary team that focuses on relieving symptoms and improving quality of life for patients with a serious or chronic illness and their families. That interdisciplinary team can include doctors, nurses, registered dieticians, pharmacists, and social workers.

Palliative care for cancer patients, for example, can begin at diagnosis and continue through treatment, follow-up care, and end-of-life, with the goal to prevent or treat the symptoms or side effects of the disease, and in some cases, the treatment regimen as well. A palliative care team will seek to address the related psychological, social, and spiritual problems associated with chronic and serious conditions.
KNOWLEDGE MATCHED WITH CARE

The California State University Institute for Palliative Care is preparing the next generation of palliative care practitioners, educators, advocates, and leaders while also educating the community about its benefits in increasing longevity, improving patient and family satisfaction with care, and reducing health care costs.

In its fourth year, the institute has grown to include 28 online programs, educating more than 2,000 current health care professionals. The institute integrated palliative care into more than 30 courses at its home base of Cal State San Marcos. The institute has also expanded its reach and now has centers at a total of seven CSU campuses across California.

WORKING AS A TEAM

The institute provides opportunities for students and faculty to undertake research and community engagement projects as well as present their data to fellow healthcare leaders and industry experts. This includes:

• Professors at Cal State San Marcos are integrating palliative care curriculum pioneered at the institute in order to provide students—and future health care professionals—with the tools and resources in order to provide a more holistic approach toward treating patients with serious and chronic conditions.

• The institute is committed to community engagement and continuing education—developing and ensuring access to valuable information, online resources, and community events for patients, their families, and caregivers as they carefully navigate the increasingly complex landscape of palliative care.
The Social Science Research and Instructional Council (SSRIC) is a collaboration of 22 CSU campuses supported by the CSU Chancellor’s Office. Founded in 1972, SSRIC is the oldest of the CSU affinity groups. The council assists learning, teaching, and research in the social sciences through access to archival database resources as well as an online repository of teaching materials, a student research symposium, and workshops for faculty.
SHARED RESOURCES AND TALENT

With representation and guidance from all 22 participating campuses, the SSRIC:

- Facilitates access to social science database subscriptions and online resources, including instructionally-related and research-related materials
- Works with the Chancellor’s Office and data providers to obtain these high-quality resources at a reasonable cost to the campuses
- Provides opportunities for training and professional development of faculty, staff, and students through teaching, research, scholarly, and creative activities
- Advises CSU administrators on policies related to quantitative social science data for research and instruction, while advancing best practice across campuses
- Represents the collective interests of the CSU campuses to external stakeholders on matters pertaining to social science research and instruction

SHOWCASE FOR STUDENT SUCCESS

The council sponsors the Annual Social Science Student Symposium, providing undergraduate and graduate students with a forum to present their work, to see the work of their peers, and to forge connections with faculty experts from across the system. The symposium rotates between northern and southern campuses each year. Students can compete for awards by submitting a research paper and presenting at the symposium.

Over the past three years, student symposium participation has increased, in part, due to the generous financial support from Dr. Gene Geisler—professor emeritus of political science at San Francisco State and one of the council’s founders. These funds provide for the SSRIC student paper awards and student travel.

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Professor Emeritus Gene Geisler (center) joins his colleagues from the Social Science Research and Instructional Council—which he helped found in 1972.
DEVELOPING SOLUTIONS FOR CRITICAL ENVIRONMENTAL ISSUES

Student and faculty researchers at CSU Bakersfield are investigating critical environmental issues that have widespread public benefit to the San Joaquin Valley and beyond. Research topics include the anticipated effects of climate change on water resources; the annual timing of snow accumulation and melt in the Sierra Nevada; and enhanced oil recovery and potential use of oilfield reservoirs. In addition, these sophisticated research opportunities provide the experience and mentoring that graduates need to continue on to a Ph.D. program or become industry and government leaders.

These efforts exemplify how research can directly contribute to important social decisions, while also creating pathways for students from communities who have been historically underrepresented in the sciences. These opportunities are supported by one of the few National Science Foundation (NSF) Centers of Research Excellence in Science and Technology (CREST) awards in the geosciences—alongside internal funds and grants from the California Department of Conservation and Chevron USA.

“California State University, Bakersfield has long been a widely respected source of students and scholarship for the California oil industry, and they are now playing a similar role for the developing carbon capture and storage industry,” notes Doug Rotman, energy program manager for the Lawrence Livermore National Laboratory. “CSUB has played an important role in educating the public about this important mission. With the potential growth of carbon capture and storage applications in California, we anticipate there will be strong demand for students trained in this area.”

AWARD-WINNING RESEARCH CONTINUES INTO STRUCTURAL ROLE OF CRITICAL ENZYME

Undergraduate Maryam Ali—under the guidance of Associate Professor of Chemistry Dr. Karlo Lopez—has undertaken two years of research on lysyl oxidase, or LOX, a copper-requiring enzyme that catalyzes the formation of intra-protein cross linkages to provide structural stability to connective tissue. In addition to being involved in connective tissue repair, LOX also may play an important role in other biological functions, including developmental control, tumor suppression, and cell motility.
Dr. Lopez’s research group recently developed ways to stably express the protein in a non-denaturing, aqueous environment, opening the way for biochemically and genetically characterizing the functionality of the enzyme. Using recombinant mutagenesis, the research is currently investigating the effects of the systematic removal of the five disulfide linkages found within the native protein.

Partially made possible by the Louis Stokes Alliance for Minority Participation (LSAMP) program, Ali presented her research at the American Chemical Society National Conference.

ENGINEERING INNOVATIONS FOR WASTEWATER TREATMENT

Oil and agriculture are two of the state’s most water-intensive industries, and also two of the largest industries in CSUB’s service region of Kern County. Agriculture alone accounts for 80 percent of the state’s water usage. Oil production surfaces billions of gallons of wastewater annually. The treatment of produced water is expensive and labor intensive, particularly in a drought. Working in partnership with OriginClear, a Los Angeles water treatment company, senior engineering students in CSUB’s California Energy Research Center are researching efficient and cost-effective ways to treat oil field and dairy wastewater for agricultural and other end uses.

Two teams of students in Physics and Engineering Assistant Professor Luis Cabrales’ course—one treating produced water from oilfields and the other treating wastewater from dairies—use OriginClear’s equipment with different technologies to innovate the company’s water treatment process. The core technology uses various anodes and electrical currents to treat water. Students analyze the wastewater qualities and evaluate possible water treatments, testing and validating the water treatment process for their reuse by local industry. The laboratory studies have the potential for large-scale adoption by oil producers in the region.

“Several of my students previously worked in the oil industry,” said Dr. Cabrales. “Their research allows them to find new opportunities in water technology to enhance the wastewater reclamation process, provide fresh water to other industries, and address water security.”
UNDERSTANDING THE RISE IN POLITICAL GRIDLOCK

Political Science Professors Scott Frisch and Sean Kelly, along with Mathematics Associate Professor Geoff Buhl, analyze Congressional voting data to identify patterns of ideological extremity over time. Specifically, their research evaluates the role that this polarization plays in governmental fiscal deadlock. Dr. Frisch, Dr. Kelly, and Dr. Buhl are extending this research to identify how interest groups become polarized, which reinforces partisanship and ideological extremity in Congress.

Appropriations committees are typically considered the most bipartisan; their power and prestige emanate from passing bills that fund much of the federal government. This research explores the rise of partisanship in the appropriations process between the 91st and the 111th Congress (1969-2011), illustrating the infiltration of ideological extremity into the appropriations process.

In addition to sophisticated mathematical models, nearly 100 interviews were conducted with current and former appropriators, committee clerks, Congressional staff, and lobbyists. Funded by university grants, these findings offer rare insight into why politics has become increasingly partisan and policies that might ameliorate this trend.

Based on their research, the professors conclude that the textbook appropriations process is ineffectual. Ideological extremity and partisanship are largely to blame for the inability of Congress to exercise its power of the purse. Congressional gridlock over appropriations matters cedes power to the executive branch to make funding decisions in a manner inconsistent with Constitutional design.

TELLING THE TALE OF TWO BORDER CITIES

Rosalba Rocha’s project, which began in fall 2014 in a collaborative research course with Assistant Professor of Sociology Luis Sanchez, examines the Mexican population in two border metropolitan areas: San Diego and El Paso. In particular, Rocha uses data from the 2012 American Community Survey and Geographic Information Systems to test theories of immigrant assimilation by measuring social and economic outcomes among both Mexican immigrants and U.S.-born Mexicans.

Rocha finds that the U.S.-born Mexican population in El Paso, Texas, fares better than their immigrant counterparts in home ownership, health care coverage, and educational attainment. In San Diego, the advantages among native-born populations is not as robust. Rocha also observed differences in neighborhood clustering. This suggests that contextual factors across various metropolitan areas have implications for immigrants’ assimilation into U.S. society.
Rocha plans to incorporate other metropolitan areas and begin gathering data on factors that might increase or inhibit immigrant assimilation. Her research was supported by the campus Interdisciplinary Research Learning Community, funded through the university’s foundation.

“Rosalba’s research experience has provided her a platform to investigate her own lived experience as a child of immigrants,” said Dr. Sanchez. “As her adviser, I have had the pleasure of watching her grow as a student and scholar. She now has aspirations to obtain a doctoral degree, something she had never imagined before becoming engaged with research.”

When an oil pipeline belonging to Plains All American ruptured last spring, sending more than 21,000 gallons of crude oil into the ocean near Refugio State Beach, the affected beaches included many that are part of a long-term monitoring project managed by Professor Sean Anderson and his colleagues in CSU Channel Islands’ Environmental Science & Resource Management program.

This monitoring project provides high-quality research experiences for students. Following the rupture, Dr. Anderson marshalled 13 full-time summer research students, with 40 additional students, to collect data on oil spill effects. Researchers began their work immediately to collect data about contamination, tarring, chemical effects, and water quality changes. Impacts on wildlife and people, including economic costs, were also considered.

Besides providing the community with important information, this project demonstrates the ways that CSU research involvement actively serves and brings value to the community. It was funded in part by Project ACCESO, a U.S. Department of Education Hispanic-Serving Institutions STEM award, and university support.

“This experience has convinced me that I am on the correct career path and want to be involved with such research professionally after graduation,” said Edgar Ruiz, an undergraduate researcher involved in the project.
MEASURING THE WIND FROM MILES AWAY

Dr. Shane Mayor, assistant professor in the Department of Geological and Environmental Sciences at Chico State, is a leader in the field of laser remote sensing. Dr. Mayor and his research group, composed of students, alumni, and working professionals, are studying fluid dynamics in laboratories, measuring the wind from miles away using atmospheric lidars, the optical counterparts to radars.

Since 2009, more than $1.3 million has been awarded to Chico State by the National Science Foundation to advance and evaluate this approach to wind measurement. The team has conducted multiple experiments at the CSU Chico Farm that serves as an excellent testing area due to its large open fields and unobstructed views. The team has also developed algorithms and licenses software to partners in the commercial sector, as well as the Department of Defense, to deduce the motion of potentially hazardous plumes.

The capability has strong potential with broad commercial value, particularly in agricultural spraying operations, wildfire suppression, airport safety, or anywhere that remote wind data is needed.

The technology is likely to be transformative in the atmospheric sciences owing to its ability to reveal the wind field, especially in environments where it is difficult to deploy traditional wind sensors. This wind data can be used to test models and theories that help predict weather and climate.

BRINGING ARCHAEOLOGICAL RESEARCH TO LIFE

The 2014 documentary film, "Impact of the Frolic," tells the story of an opium clipper shipwrecked off the California coast near Mendocino in 1850. Chinese ceramic artifacts from the ship were discovered by local Native Americans in the 1980s, helping to explain connections between cultures that have had a tremendous impact on California.

"Impact of the Frolic" is important because it shows the connection, communication, and trade between countries at a time when California was first being settled," explains Matthew Ritenour, the film’s director. He and Arik Bord, the film’s director of photography, were Chico State undergraduate anthropology students when they produced the film. They drew on the research of former San José State archaeologist Dr. Thomas Layton for the film.
The film was produced in the anthropology department’s Advanced Laboratory for Visual Anthropology, built in 2010 by Anthropology Professor Brian Brazeal and his research team, with support from the National Science Foundation and the university.

“Impact of the Frolic” received an Emmy Award in June 2015 as well as top honors in the Historic/Cultural Program Category for Northern California. It was accepted for nationwide television broadcast through the National Educational Television Association and became available to PBS affiliate stations nationwide in September 2015.

The 28-minute film can be viewed at http://vids.kvie.org/video/2365321356

A team of divers revisit the site of a 19th-century shipwreck to capture underwater footage of the wreckage for the film “Impact of the Frolic.”

REUSING SPENT BREWER’S GRAIN AS FEED FOR BEEF CATTLE

An innovative study by Chico State researchers examines how spent brewer’s grain from a locally-owned brewery can be used in winter feed for cattle. Dr. Kasey DeAtley, assistant professor, and Dr. David Daley, interim dean of the College of Agriculture, are developing sustainable waste management for the brewery while simultaneously benefiting beef production.

The strategy provides a new sustainability model in which one industry’s by-products are diverted from the waste stream and used by a second industry to reduce food production costs. The research indicates that cattle who received distiller’s grain-supplemented feed ate more, digested it better, and gained more weight. California’s extended drought enhances the importance of this research, as feed costs are now 80 percent of total production costs for regional farmers and ranchers.

Chico State’s research not only evaluates how beer by-products may serve as a cost-effective component of feed for livestock, but points to potential cost savings and income for brewers.

Chico State students are closely involved in the research, feeding the animals, taking weight measurements, collecting samples, and conducting analytical work. The research is funded by the Sierra Nevada Brewing Company—founded by Chico State alumnus Ken Grossman—and the CSU Agricultural Research Institute.
PROVING THAT "THIEVING" ANTS BELONG TO A DISTINCT CASTE

A CSU Dominguez Hills professor’s research proves that “thieving” ants belong to a distinct caste. His discovery helps scientists understand the evolution and occasional dissolution of colony boundaries among ants.

Thieving ants have specialized workers that infiltrate neighboring colonies to take food back to their own colony. The existence of this behavior was already known, but whether these thieves were a distinct caste from regular foraging workers was unknown.

A team led by Dr. Terry McGlynn, professor of biology, conducted experiments showing that these thieves behave in a fundamentally distinct manner and actively avoid interacting with other individual ants.

Collaborators on the project included students and professors at the University of Hawaii and the University of Otago, in New Zealand. The findings of this preliminary work form the basis for a more comprehensive investigation of the sociogenomics of the ant *Ectatomma ruidum*—a species whose origin remains mysterious.

Dr. McGlynn’s project has been accepted for publication in the journal *Animal Behaviour*. It received funding from the National Science Foundation, International Research Experiences for Students, the Tropical Ecology Mentorship Program of CSU Dominguez Hills, and CSU Louis Stokes Alliance for Minority Participation.

MEASURING THE COLLEGE CLASSROOM IMPACT OF CELL PHONE USE

Multitasking is a part of everyday life. But studies show that texting, social networking, and using other forms of communication via smartphones interfere with college students’ classroom learning.

Very little is known about the level of digital device metacognition among university students. A study conducted by undergraduate student Abraham Ruiz attempted to define and measure digital metacognition with respect to smartphone usage in the classroom.

Under the mentorship of psychology professor Mark Carrier, Ruiz’s study found that the students who used their smartphone during class lectures believed they were still able to pay attention. When asked whether they found any benefit to using their phone in class the students did not...
believe there were benefits, and they mostly felt they used their devices wisely. The conclusion? Ruiz’s study found that students didn’t think there was any negative impact on their learning as a result of using their phone during class.

Ruiz became interested in critical thinking while taking a course with Dr. Carrier, later joining his research laboratory. While working on the Digital Metacognition project, Ruiz presented his results at the first International Convention of Psychological Science in Amsterdam. His research was funded by the National Institutes of Health.

Ruiz has now begun a doctorate program in applied developmental psychology at the University of Maryland, Baltimore County.

CREATING NEW PATHWAYS FOR SUSTAINABLE ENERGY

Meeting growing energy demands is a matter of national urgency. Yet while buildings and their occupants are responsible for nearly half the energy consumed in the U.S., designing and managing energy-efficient buildings are both difficult tasks.

CSU Dominguez Hills assembled an interdisciplinary team to work with collaborators at the University of Southern California (USC) to improve energy literacy in a way that informs sustainable building design, while integrating and influencing occupants, designers, operators, and the buildings themselves to reduce energy consumption and keep occupants comfortable.

The project includes faculty and students from architecture, civil engineering, computer science, and psychology and represents a paradigm shift by incorporating sustainability goals into building design rather than focusing on improving post-construction energy consumption.

This project, funded through a National Science Foundation grant, broadens and deepens collaboration between CSU Dominguez Hills and USC. The tools and methodologies developed as part of this initiative will lead to related research projects, particularly for the planned Dominguez Hills’ graduate systems engineering program.

“Our faculty strives to provide our students with rich classroom and experiential opportunities,” says Dr. Antonia Boadi, who leads the project. “As a product of both CSU Dominguez Hills and USC [myself], it is my desire to establish a pipeline of students into doctoral programs.”
STUDYING EXTREME ORGANISMS MAY PROVIDE KEY TO LIFE ON MARS

Biological Sciences Professor Carol Lauzon is partnering with NASA biologist Ken Cullings to study the foot-size fungi *Pisolithus tinctorius*, also known as Dead Man’s Toe. Cullings was the first to look for answers as to how Dead Man’s Toe survives in nutrient-deficient environments.

Lauzon and Cullings are studying the origin, evolution and functional diversity of bacteria found inside the sulfurous membrane of the fungus. Advanced technology is used to amplify and sequence genes, providing clues to their origins. The microbes are estimated to be 3.5 to four billion years old. Some do not appear to have evolved from any known organism.

Identifying how these extremophilic microbes create self-sustaining energy from the chalky, acidic landscape—found in Yellowstone Park geysers and the thermal lands of New Zealand—opens up untold possibilities, including discovering life on other planets and growing food in outer space.

Cullings says the project “provides a new model for how life might have survived on Mars. Something like this [fungus], which adapted to the harshest and driest environments, could easily survive in such normally inhabitable zones.”

The three-year joint research project is funded by a $1 million NASA grant. The project also creates opportunities for Cal State East Bay graduate students such as Kaushalya Tillakarantha and Charles Richard to develop research skills. Julia DeSimone, a research associate in NASA’s Ames Research Center, notes that scientists would need to explore Earth’s previously uncharted territories in order to find new life.

“The realization that new life can still be found in common places is amazing,” DeSimone says. “This project has expanded my horizons by allowing me to explore different techniques in genomics and discover new life in unexpected places.”

PREPARING THE U.S. OLYMPIC FENCING TEAM FOR THE 2016 SUMMER GAMES

Under the guidance of Kinesiology Assistant Professors Vanessa Yingling and Jenny O, Cal State East Bay graduate students Derek Yang and Nate Frost are using Dartfish, a popular video analysis software program, to help the U.S. Olympic Fencing Team prepare for the 2016 Summer Olympics. Dartfish allows kinesiologists, physical therapists, occupational therapists, coaches, and athletes to perform digital assessments of movement with precision.

Cal State East Bay graduate students Derek Yang and Nate Frost help the U.S Olympic Fencing Team by using software to measure biomechanics.
Yang and Frost record physical movements that can be played back to coach and assess athletes. They also provide off-site testing at the team’s training site in the Bay Area and at the U.S. Olympic Training Center, in Colorado Springs.

“Bringing [Dartfish] into the biomechanics laboratories adds a new dimension that goes beyond theory,” says Dr. Yingling. “Students are required to use video to describe biomechanical concepts they learn in class. It also forces them to collaborate and problem-solve on their own.”

Within the kinesiology program, “our students are challenged to develop and demonstrate proficiency in science, technology, engineering, and math-related content knowledge and practical skills,” explains Dr. O. “Real-world projects like helping the Olympic team keep students interested.”

PROVIDING NEEDED SUPPORT FOR FAMILIES

The Hayward Promise Neighborhood is a collaboration of 10 local agency partners, led by Cal State East Bay and its Dean of Education, Carolyn Nelson. Partners work to prepare children in Hayward’s Jackson Triangle Neighborhood for a successful transition to postsecondary education and for a rewarding career through strong school, community, and family support systems.

“Our promise is to ensure the long-term health, safety and economic well-being of the entire Hayward community,” Nelson explains. “Together, we are building a healthy, empowered, and educated community where every child has the opportunity and resources to succeed.”

Hayward Promise Neighborhood’s data system tracks the project’s benefit over time. Partners share information on 1,800 participants to refine and enhance services based on community need. Cal State East Bay harnesses this data in support of its ongoing regional stewardship research and activities.

Funding comes from a five-year, $25 million U.S. Department of Education grant and each partner provides a 100 percent match. Private sponsors have included the W.K. Kellogg Foundation, AT&T and the San Francisco Foundation.

“I think of Adriana, the Harder Elementary School PTA president, and her daughter, Melina, who told me her dream to be the first woman president of the United States,” says Congressman Eric Swalwell (D-15th District). “The good people with Hayward Promise Neighborhood are committed to empowering parents like Adriana with the skills to make sure Melina—and every child like Melina—has the opportunity to become the first woman president or anything she wants to be.”
IMPROVING SUCCESS FOR SOUTHEAST ASIAN AMERICAN STUDENTS

A Fresno State research project aims to assess the impact of various intervention strategies designed to improve retention and graduation rates of Southeast Asian American first-time freshmen. The research will provide timely, relevant information for long-range strategic planning. As a result, students will be more aware of potential benefits and hindrances to their academic achievement.

“I did not have a mentor when I was an undergraduate,” notes graduate student Simara Vongthongdy, who works on campus as a peer navigator. “I’m grateful to have a platform to share my experiences to inspire the younger students.”

The research—designed by Provost Lynnette Zelezny and Dr. Yoshiko Takahashi, associate professor of criminology—stems from an original survey research project conducted by the Fresno State Asian Faculty and Staff Association in 2014. The survey revealed several key findings: Southeast Asian American students are more likely to be low-income, require pre-collegiate skills training, and lack a sense of belonging.

Directed by faculty researchers with diverse academic backgrounds, the research has broad-based support from a volunteer committee of faculty, staff, alumni, graduate students, and local community leaders. The research is funded by the CSU Chancellor’s Office and the Wells Fargo Foundation.

The goal of the project is to identify best practices that can be used as a model for Asian American-, Native American- and Pacific Islander-serving institutions nationwide.

“The project allowed me to see the struggles and the necessary tools to help Southeast Asian students to be successful,” says Tom Thao, student coordinator at the Cross Cultural & Gender Center and a graduate student in multilingual and multicultural education.

GENERATING VITAL WATER DATA FOR CENTRAL VALLEY GROWERS

In the midst of California’s historic drought and plummeting agricultural revenue, a collaborative project between researchers from Fresno State, Cal State Monterey Bay, the USDA, NASA, and local growers will provide farmers with essential data to determine the watering needs of drip-irrigated crops.
Plant science graduate student Touyee Thao’s research project aims to pinpoint water requirements of selected vegetable and row crops and integrate these key measurements into the Satellite Irrigation Management Support system built jointly by California State University, Monterey Bay and NASA. Results will be shared with California growers, irrigation district managers, and government agencies.

This project aims to optimize water use efficiency to provide short-term water conservation. It promises to conserve local water supplies and contribute to lower use of electricity and diesel fuel for groundwater pumping.

Funded by the CSU Agricultural Research Initiative, Thao’s project encourages the trend toward the use of drip irrigation, while assisting growers—especially those in areas where water is less available—to optimize water use and increase farming revenues.

“Living in California for most of my life while pursuing a graduate degree in plant science, I have come to realize the difficulties that California agriculture will be facing in the near future,” Thao notes. “I hope the findings from this collaborative work between experts from different fields of discipline will aid with scientific progression in crop water requirement, crop water use efficiency, and water conservation. It is significant not only to California agriculture, but the entire state’s economy.”

ASSESSING ECONOMIC AND HUMAN COSTS OF THE DROUGHT IN THE SAN JOAQUIN VALLEY

A persistent drought is exacting an enormous economic and human cost in California’s farming heartland. Researchers from eight San Joaquin Valley counties collaborated in a comprehensive assessment of the historic drought’s wide-ranging effects.

Fresno State’s Water Cohort team members included economics, civil engineering, public health, urban/regional planning, and mass communications faculty, plus experts from the California Water Institute.

The need for a comprehensive drought impact assessment in this region is compelling. A 2014 UC Davis study notes that 70 percent of the statewide crop revenue losses and most of the dairy losses are likely to occur in the San Joaquin Valley—a region that produces a significant portion of the country’s fruits, nuts, vegetables, and cotton.

Fresno State is expanding on the original report, providing a fuller picture of the devastating effects in the heartland of the San Joaquin Valley. The report, funded by a Wells Fargo Foundation grant, presents five conclusions and recommendations for changing perceptions and attitudes about water and water use and contains resources for further study and public participation.

“Fresno State is making water awareness a main university-wide theme,” notes David Zoldoske, director of the Fresno State Center for Irrigation Technology. “To fully understand the role of water in the San Joaquin Valley, it will take the collective expertise found at Fresno State. This report represents substantial progress in achieving that goal.”
DEVELOPING NEW APPROACHES TO COMBAT ANTIBIOTIC RESISTANCE

Hard-to-treat and untreatable antimicrobial-resistant bacterial infections jeopardize the lives of patients, increase the cost of treatment, and threaten the use of certain medical and dental procedures. Yet, the number of new antibiotics in development is dangerously low.

Dr. Marcelo Tolmasky, professor of biological sciences, and his research team at Fullerton are devising agents that help prolong the effectiveness of currently available antimicrobials by interfering with the mechanisms that bacteria use to resist antibiotics. In particular, the team studies agents that might prevent resistance to a class of antibiotics known as aminoglycosides. The agents developed, when administered in combination with aminoglycoside antibiotics, would eliminate the bacteria’s ability to resist the action of the antibiotic, which would clear the infection.

The research team has clarified different aspects of the molecular mechanisms by which bacteria resist the action of aminoglycoside antibiotics and how the resistance traits disseminate among different pathogens. This knowledge is used by the team to design the combination therapies mentioned above that will permit them to successfully treat aminoglycoside-resistant infections.

The project has been funded by grants from the National Institutes of Health and the CSU Program for Education and Research in Biotechnology. The research group engages in multidisciplinary collaborative subprojects with other groups in prestigious institutions across the world.

“Dr. Marcelo Tolmasky is an outstanding biomedical researcher who is passionate about science,” says Dr. Chandra Srinivasan, professor of biochemistry. “He has earned a global reputation for the work he is conducting on antibiotic resistance at CSUF.”

INAUGURATING A NEW ERA OF ASTRONOMY

Titan researchers were key contributors to the first direct detection of gravitational waves. These waves were produced by the collision of two black holes 1.3 billion years ago and their discovery confirmed a major prediction of Albert Einstein’s 1915 general theory of relativity.

The gravitational waves were detected on September 14, 2015, by twin Laser Interferometer Gravitational-wave Observatory (LIGO) detectors in Livingston, Louisiana, and Hanford, Washington, funded by NSF and conceived, built and operated by Caltech and MIT. The NSF and LIGO Scientific Collaboration—a group of more than 1,000 scientists from
universities across the U.S. and 14 other countries, including Cal State Fullerton—announced the discovery on February 11, 2016.

“This discovery inaugurates a new era of astronomy,” says Dr. Joshua Smith, associate professor of physics, and CSUF Dan Black, director of Gravitational-Wave Physics and Astronomy Center.

Titan researchers also include Dr. Jocelyn Read and Dr. Geoffrey Lovelace, both assistant professors of physics, and Dr. Alfonso Agnew, professor of mathematics. More than 40 students have worked on this groundbreaking research, with seven alumni currently enrolled in doctoral programs at Caltech, Syracuse University, and Louisiana State University.

Dr. Smith, Dr. Read and Dr. Lovelace, along with Joseph Areeda, a computation specialist, and six physics graduates, are co-authors of the Physical Review Letters journal article outlining the discovery. Dr. Smith and Dr. Read also are leaders in the LIGO Scientific Collaboration working groups that searched for and validated the gravitational-wave signal.

Dr. Lovelace and his students contributed simulations of two black holes merging that are featured in the journal article.

CSUF scientists have received over $2 million in funding from NSF and the Research Corporation for Science Advancement for their research.

CREATING A CANCER NETWORK FOR PACIFIC ISLANDERS

Led by Dr. Sora Tanjasiri, professor and chair of health science, the Weaving an Islander Network for Cancer Awareness, Research, and Training (WINCART) Center is comprised of six community-based organizations and researchers from three universities. The goal of the WINCART Center is to reduce disparities in cancer incidence and mortality among Chamorro, Marshallese, Native Hawaiian, Samoan, Tongan, and other Pacific Islanders in Southern California.

The Center conducts research, training, implementation, and evaluation of community-based education to promote beneficial biomedical and behavioral procedures. Research areas include tobacco cessation intervention research with late adolescents and young adults; attitudes toward the collection of biospecimens among adults; and culturally-tailored health promotion regarding obesity and physical activity.

With funding from the National Cancer Institute’s Center to Reduce Cancer Health Disparities, the project’s other participants include USC and Claremont Graduate University. In addition, the WINCART network includes numerous Pacific Islander-serving community-based agencies: Guam Communications Network, Orange County Asian and Pacific Islander Community Alliance, Pacific Islander Health Partnership, Samoan National Nurses Association, Tongan Community Service Center/Special Service for Groups, Inc., and Union of Pan Asian Communities.

“What we’re trying to do is not only increase everyone’s health, but close the gap in health care so that underserved populations obtain the same level of treatment,” Dr. Tanjasiri says. She estimates there are more than 100,000 Pacific Islanders living in Los Angeles, Orange, San Diego, Riverside, and San Bernardino counties.
PRODUCING BIO-ENERGY AND BIO-PRODUCTS FROM FOREST RESIDUES

Humboldt State’s Waste to Wisdom is a biomass research project focused on the conversion of forest residues into renewable energy and other valuable bio-based products.

Forest residues include small-diameter trees and other materials often burned or left to decay due to the high cost associated with collection and transportation. But these residues provide an opportunity to create useful products, such as biochar and briquettes.

The Waste to Wisdom project studies the use of biomass conversion technologies that are capable of operating near forest harvest operations. This proximity adds value while significantly reducing transportation costs. Additionally, new methods of collection and transportation are being examined.

An environmental, economic, and market analysis of the lifecycle of biomass conversion products also will be conducted. The goal is to increase awareness of the economic and environmental benefits of utilizing forest residues.

The project is led by Professor Han-Sup Han of Humboldt State’s Department of Forestry & Wildland Sciences, with multiple regional partners—including universities, government forest and land management agencies, private logging and forest companies, and other industry leaders.

Waste to Wisdom is funded through a three-year, $5.88 million grant from the U.S. Department of Energy (DOE). It is part of the Biomass Research and Development Initiative, a collaborative effort of the DOE and the U.S. Department of Agriculture.

DEVELOPING NEW SYSTEMS FOR WASTEWATER TREATMENT AND REUSE

As an undergraduate, Jairo Luque Villanueva researched wastewater treatment and water reuse under the direction of Environmental Resources Engineering Assistant Professor Andrea Achilli.

Villanueva’s passion to undertake this research was motivated by personal experience. He grew up in Tijuana, Mexico, where access to clean, safe drinking water was a luxury. As a result, he became interested in the biological, social, and economic issues surrounding international water scarcity, which affects about 1.2 billion people worldwide.
Villanueva and his student research partners designed and constructed a forward osmosis and membrane distillation system, a device that treats wastewater for potable use. The prototype is part of a larger research initiative in partnership with the University of Nevada, Reno, exploring low-energy, large-scale wastewater treatment. If successful, it could be adapted for full-scale use.

“My research experience as an undergraduate fellow allowed me to travel and meet student researchers, professors and engineers across the country,” notes Villanueva. “I encourage students to participate in undergraduate research, especially if they are considering graduate school.”

Villanueva was one of 33 students from around the country to receive a prestigious Greater Research Opportunities Fellowship from the Environmental Protection Agency. Fellowship recipients receive an internship and up to $50,000 over two years to fund their studies and research in the sciences and math.

PROTECTING ATHLETES FROM CONCUSSIVE INJURY

Elizabeth Larson, North Coast Concussion Program coordinator, and Justus Ortega, associate professor in the Department of Kinesiology and Recreation, are researching ways to better diagnose and protect athletes from the neurological damage of concussions.

By measuring how athletes respond to a battery of cognitive tests prior to their competitive season, the researchers establish a baseline that can be compared to subsequent data if an individual experiences head trauma. The process demonstrates the progressive deterioration that can occur following multiple incidents. The data also represents the largest single collection of its kind gathered to date, providing a valuable resource for concussion researchers nationwide.

Baseline concussion testing is a critical component of post-injury management services for thousands of Humboldt and Del Norte County residents each year. Dr. Ortega’s research teams consist of students who get hands-on research experience conducting the testing.

“Many of the students working in the North Coast Concussion Program have gone on to work in a variety of institutions across the U.S. and found the program provided them with cutting-edge experience not available at most four-year universities,” says Larson.

By promoting a greater understanding of sports-related head injuries, the project aims to motivate other universities to become involved, furthering research into diagnosing, protecting and treating not only athletes, but anyone who experiences head trauma.

The program recently received a $242,000, two-year research grant from the National Collegiate Athletic Association and the U.S. Department of Defense.
TRACKING TURTLES

Those who use the San Gabriel River Trail between Long Beach and Seal Beach, and Anaheim Bay near the Seal Beach Naval Weapons Station, have been delighted to see an unusual sight in the water: Eastern Pacific green sea turtles, a federally listed endangered species.

Marine Biology Professor Christopher Lowe studies a variety of sea creatures and is an expert in underwater tracking technologies. National Oceanic and Atmospheric Administration (NOAA) Fisheries approached Dr. Lowe, in fact, to help study turtle movements, so he and his graduate student, Dan Crear, are working with NOAA researchers who hold capture and tagging permits, applied acoustic transmitters to 18 turtle shells.

Dr. Lowe and Crear examined how anthropogenic (human) effects on water temperature may influence turtle distribution and residency. “There are several power plants in the river that discharge seawater used to cool the generators,” Lowe explains. Turtles like the warm outflow water, so Lowe’s group put acoustic listening stations and water temperature loggers along a section of the river and in Anaheim Bay.

“Most of the turtles tagged in the river stayed in the river,” says Lowe, while some traveled to Anaheim Bay and even into Long Beach’s Alamitos Bay in the summer. In the winter, however, they all returned to the warmer river, Lowe explained.

AIDING RECOVERY FOR UNDERSERVED VICTIMS OF VIOLENCE

The Long Beach Trauma Recovery Center, which provides services that significantly decrease Post-Traumatic Stress Syndrome, depression, anxiety, and functional impairment of its diverse, low-income clients, concluded a longitudinal study of patient outcomes.

The center, run by Professor Bita Ghafoori, strives to remove barriers to care for underserved victims of crime by creating a comprehensive model of trauma and mental health care for victims of crime and their families. The center includes a multidisciplinary group of community professionals, behavioral scientists, clinicians, and students dedicated to providing education, services, and treatment to victims of violence.

Trauma center teams work together with law enforcement and academics to study best practices for violence intervention. They also provide evidence-based, actionable solutions for victims of violence, educators, industry, government and other stakeholders.

The Long Beach Trauma Recovery Center, only the second trauma recovery center established in California, is run by Professor Bita Ghafoori.
Victims of crime and their families receive mental health services, community outreach, clinical case management, and assistance with crime victim compensation documentation. The center team coordinates with police, the prosecutor’s office, the district attorney’s office, the City of Long Beach, and community agencies.

The center also offers opportunities for undergraduate students to assist with outreach, education, and research. Graduate students pursuing master’s degrees in counseling, marriage and family therapy, and social work are trained in evidence-based, culturally appropriate, and trauma-focused mental health services.

FLYING HIGH

Psychology Professor Kim-Phuong Vu, associate director of CSULB’s Center for Human Factors and Advanced Aeronautics Technology (CHAAT), is trying to understand how humans deal with increasingly complex transportation automation.

One of her projects is a four-year NASA grant in collaboration with the NASA Ames Flight Deck Display Research Laboratory and the firm Rockwell Collins to study an aviation concept called Reduced Crew Operations.

“With the automation technology that’s been developed over the years, now we’re looking at whether it’s possible to reduce the crew to one pilot and have ground support—maybe an operator in a ground station who can provide assistance when needed,” and support multiple pilots at once, she explains. However, it’s essential that both pilots fully know what each other are doing and how to handle emergencies.

“It’s a really new groundbreaking area,” Vu says.

Students work in the CHAAT laboratory during the academic year and have come to NASA Ames Flight Deck Display Research Laboratory during the summer so well-prepared that NASA presented last year’s group with certificates of achievement.

“We brag in the human factors program that we have 100 percent placement rates for our students within six months of graduation,” adds Vu.
DETERMINING CLIMATE WARMING EFFECTS ON PRECIPITATION PATTERNS

The impact of a warming climate on precipitation is very complex and the outcome of two opposing forces: a surface-drying effect that reduces the frequency of precipitation, and a wetting effect that increases atmospheric water vapor. A research project led by Dr. Hengchun Ye, professor and chair of the Department of Geosciences and Environment and the director for NASA DIRECT-STEM, aims to quantify the relationship between a warming climate, changing precipitation characteristics, and their associations with atmospheric conditions, such as air temperature, atmospheric circulation patterns, and atmospheric water vapor content.

This data is critical to understanding changing trends and interactions with other climatic components of the earth’s system; understanding these factors will enable the planet to develop resilience to climate change and its effects. Dr. Ye’s research is unique because it uses multiple sources of data, different methods of data processing and data imaging, and various statistical tools to improve our understanding of the changing world.

So far, the research findings predict that a warming climate will lead to a shorter snowfall season, increasing precipitation intensity, decreasing frequency of wet days, and increasing the frequency of severe weather. Consequences include more flooding and prolonged droughts.

This project is jointly funded by three offices of the National Science Foundation: Geography and Geospatial Sciences, Climate Dynamics, and Arctic Natural Sciences. Dr. Ye is also supported by the Jet Propulsion Laboratory as a summer faculty fellow.

DESIGNING AND BUILDING COMPETITIVE HYBRID CARS

EcoCAR 3 is an advanced plug-in hybrid vehicle design-and-build competition that prepares the next generation of advanced automotive engineers and professionals. It challenges 16 North American universities to redesign stock 2016 gasoline Chevrolet Camaros into clean hybrid vehicles. An 80-person team of Cal State LA students—the only team representing California in this competition—is designing a police-themed plug-in hybrid.

The competition is sponsored by the Department of Energy, General Motors, the National Science Foundation, and California Air Resources Board.
Board, and is managed by Argonne National Laboratory. The team is sponsored by Cal State LA, La Kretz Foundation, SCAQMD, and local industry.

The technical disciplines are represented by students from electrical engineering, mechanical engineering, and computer science. The team receives advanced training from GM and other industry partners on modern vehicle design and development, which gives them an edge in securing employment; thanks to their participation in the EcoCAR2 competition, six students have been recently employed at General Motors.

“Through the EcoCAR program I have been exposed to the very same tools and procedures that are used in the automotive industry,” says Christopher Reid, a GM engineer and former student team lead. “Because of this I was able to get a job at General Motors and jump right into an engineering job without any issue.”

SPEAKING FOR JUSTICE

Cal State LA students collaborated with an 11th grade history teacher at Mendez High School to develop history lesson plans on the 1945-47 Mendez v. Westminster desegregation court case. The lesson plans prepared the high school students to conduct oral history projects and write personal essays.

Education nonprofit 826LA collected the students’ essays in a book entitled “We Are Alive When We Speak for Justice.” It examines the legacy of the landmark case, including the 1968 East Los Angeles walkouts, exploring themes of ethnic identity and challenges still faced by the community of Boyle Heights.

The project gave students the freedom to share their experiences and observations. “I wanted to write something that came out of my heart. I made it perfect in my own way,” says student Kenia Garcia.

Students also gained skills directly applicable to college-level courses. “I feel I can go to any college I want because I am a published author,” wrote student Jaqueline Ramirez, who especially enjoyed her experience working on the editorial board.

Student Kenny Coronel says learning the foundation that sent him to a Chicano leadership conference last fall was named in honor of a teacher who participated in the 1968 walkouts really “opened my mind,” adding that working on the book fundamentally changed his self-image.
AUGMENTING REALITY WITH A WEARABLE NAVIGATION SYSTEM

With the help of Google Glass, Cal Maritime faculty are developing an entirely new marine navigation system. This wearable, immersive augmented reality system engages the user by presenting embedded or superimposed images, technical details, and sounds or tactile sensory information.

By helping navigators keep their focus on the view outside a ship’s bridge windows, the wearable system promises to be more intuitive and potentially safer than existing electronic navigation devices.

This head-mounted display—which utilizes GPS location services and gyro stabilization to provide situational awareness information in a maritime environment—is unique. If developed successfully, the device could replace industry-standard fixed and semi-portable electronic navigational systems. Small vessels and high-speed vessels are particularly suitable for this type of navigation.

This research is based on earlier work done on fixed maritime head-up displays, published in the Journal of Navigation in October 2011. In that study, a prototype was tested in a full-mission bridge simulator at Cal Maritime. The results demonstrated this type of display could help maintain situational awareness in challenging navigational conditions at sea.

UNDERSTANDING PHYTOPLANKTON GROWTH TO BETTER TEST WATER TREATMENT

Cal Maritime’s Training Ship Golden Bear is a floating test facility. Its ballast water management system provides certification to outside companies that remove microscopic marine organisms. Without treatment, these organisms travel between ports, invading and disrupting natural ecosystems.

The testing adheres to strict protocols mandated by the U.S. Environmental Protection Agency and the U.S. Coast Guard, including using challenge water that contains elevated concentrations of phytoplankton. This challenge water is generated in-house by adding nutrients containing nitrogen, phosphorus, and silicate to stimulate phytoplankton growth.
This partnership provided an opportunity for Cal Maritime student Hannah Foster to determine the optimal time required to achieve desired concentrations of phytoplankton, and the role nutrients play in altering phytoplankton species diversity.

“Hannah’s project allows us to better understand how the indigenous phytoplankton population grows in our incubator tubs with added nutrients and little else,” says Richard Muller, the facility’s engineering operations manager. “Hannah has been very enthusiastic in her work and has learned how to use engineering and scientific instrumentation normally unavailable to students.”

The student-led project is funded through the CSU Council on Ocean Affairs, Science and Technology Undergraduate Research Support Program.

TESTING THE EFFECT OF WETLANDS ON DELTA WATER QUALITY AND FOOD AVAILABILITY

The State of California has proposed restoring up to 100,000 acres of wetland habitat in the San Francisco Bay Delta ecosystem as part of the Bay Delta Conservation Plan. The plan has a massive scope, with an estimated implementation cost of $27 billion occurring over decades. Yet, many potentially positive outcomes carry a high degree of scientific uncertainty.

For example, wetlands are believed to be local sources of organic matter that serve as food for organisms. They are also thought to reduce nutrient pollution, mitigating the potential for harmful effects. Dr. Alexander Parker’s project brings together the CSU with state and federal natural resource agencies to test these hypotheses. Water quality data is collected from fixed sensors and during sampling cruises, characterizing the cycles of organic matter production and biological uptake of nutrients in the Liberty Island/Cache Slough Complex in the Delta.

“The last several years of drought have raised both awareness and the urgency to invest in modernizing how water resources are managed,” says Dr. Parker, assistant professor of oceanography. “It is encouraging to see that California is approaching decision-making based on the best available science.”

In addition to its immediate application to California, this project will inform estuary management decisions globally. It is funded by the State and Federal Contractors Water Agency. Other partners include San Francisco State University and the U.S. Geological Survey.

> Dr. Alex Parker sampling in the Gulf of the Farallones National Marine Sanctuary.
CHRONICLING THE HISTORY OF FORT ORD

Cal State Monterey Bay occupies the site of the former Fort Ord military base, the largest and most important military base in the U.S. to be closed. Enid Baxter Ryce, professor of cinematic arts and environmental studies and chair of cinematic arts, developed Planet Ord to document the history, ecology, and visual culture of the military relics.

In collaboration with the Smithsonian and the Monterey Museum of Art, Baxter Ryce is compiling veterans’ oral histories for a special collection at the Library of Congress and a series of exhibitions describing Fort Ord’s history and environment for museums, libraries, and government agencies.

Baxter Ryce’s Planet Ord website had more than four million hits, a testament to its international impact. It’s funded in part by the California Council for the Humanities, the War Comes Home Initiative, and private donations.

“The Planet Ord project dramatically illustrates the intriguing interaction that can occur between person and place; the key role that Fort Ord played in many veterans’ lives, and in turn, the impact of the military community on it,” says Megan Harris, a Library of Congress reference specialist.

“Professor Baxter Ryce is a visionary and a bridge-builder,” says Charlotte Eyerman, executive director of the Monterey Museum of Art. “As a visual artist steeped in a sophisticated multimedia practice, she is also an historian, a storyteller, a connector of past and present.”

AIDING EATING DISORDER RECOVERY BY UNDERSTANDING ANXIETY

Recovery from an eating disorder is typically a long, arduous process characterized by moments of relapse. But an undergraduate student’s study could aid the eating disorder community by better understanding the connection between eating disorders and anxiety disorders.

Cal State Monterey Bay psychology student Rebecca Von Oepen, who graduated December 2015, examined anxiety levels in relation to eating disorder behaviors using archival data provided by The Lotus Collaborative, an outpatient program that serves Santa Cruz and Monterey Bay.

Working with the program, Von Oepen’s research led to the development of a database that the center’s therapists use to track the longitudinal changes in clients’ eating disorder behaviors and anxiety levels. The tracking of changes has improved treatment techniques and further refined the assessment tools used by The Lotus Collaborative.

Rebecca Von Oepen presented her research at CSUMB’s Capstone Festival, where every graduating student must present a final project.
Von Oepen’s accomplishments, both as a mentor with The Lotus Collaborative and as the founder of an on-campus support group for college students struggling with body images issues, were recognized with a campus service learning award.

“This research can make important contributions to understanding the impact of specific treatment practices on mental health as they relate to anxiety and eating disorders,” says Cal State Monterey Bay’s Dr. Mrinal Sinha, assistant professor of psychology. “Insights gleaned from the data analyses can be implemented quickly, thereby improving the physical and psychological well-being of people participating in the organization’s programs.”

BETTER PREPARING NEW TEACHERS

Recruitment of teachers for high-need rural schools is the primary objective of Education Professor Mark O’Shea’s El Camino Education Alliance. The collaboration of Cal State Monterey Bay, Cal Poly San Luis Obispo, and partner school districts seeks to make improvements in teacher preparation by placing clinical experience at the heart of the curriculum and augmenting critical curriculum components.

The two California State University campuses are responding to a tremendous need in the school districts that lie between them, a large span of rural and remote schools where teacher shortages are constant and school districts want incentives to keep their highly qualified teachers. In partnership with 10 surrounding public school districts, Alliance-related programs will assist nearly 75,000 students, using teacher performance and K-12 student success data for ongoing assessment.

One example is a co-teaching program in its fifth year at Del Rey Woods Elementary School. “We have seen outstanding results,” says Dr. Ramiro S. Reyes, Del Rey Woods’ principal. “I am confident the program prepares teachers extremely well for their first year in the profession.”

Support for related partnerships at the 10 public school districts is funded by an $8.6 million Teacher Quality Partnership grant from the U.S. Department of Education. The El Camino Education Alliance aims to increase the number of teachers who complete the credentials in STEM fields by 10 percent each year, starting in the second year with a target retention rate of 80 percent or higher for new teachers.
CONNECTING THE DOTS BETWEEN POLICY CHANGE AND CLIMATE CHANGE

Dr. Kimberly Kirner, associate professor of anthropology, leads an interdisciplinary team investigating complex questions about how climate and policy change affect human-environment relationships in arid regions.

Dr. Kirner’s project examines how the relationship between water availability and plant communities has changed in the Eastern Sierra over the last 50 years. Kirner, her faculty collaborators, and three CSUN graduate students conducted field work at the White Mountain Research Station in 2014 and 2015. They collected plant samples, conducted vegetation transects, took spectrometer readings, compared field data to remote satellite images, and characterized plant communities.

The researchers bolstered this empirical data with photographs, maps, reports and other archival documents, as well as interviews that included area residents, ranchers, and members of four Paiute and Paiute-Shoshone tribes. A final year of analysis will clarify how climate change and policy change together will shape the landscape. The data will be used to help Los Angeles water conservation organizations educate Angelenos on how water use affects a much broader region.

Krystal Kissinger, an anthropology graduate student, was motivated to participate in the project because her thesis research focused on the history of labor surrounding the construction of the first Los Angeles aqueduct, and the archaeology of the work camps that extended from the Owens Valley to Los Angeles.

“I believe if more people understood where the water that comes out of their faucet came from, and that it is a limited resource, then they might become more conscientious of their water usage,” says Kissinger. Since completing her work on Kirner’s project and graduating with her master’s degree, Kissinger has joined the National Forest Service in the Eastern Sierra.

ADVANCING REGENERATIVE MEDICINE IN UNIQUE WAYS

Malachia Y. Hoover’s findings could lead to advances in the field of regenerative medicine by offering novel therapeutic approaches for treating degenerative diseases through the use of stem cells.

Hoover, a graduate student in Dr. Jonathan Kelber’s Developmental Oncogene Laboratory, investigates the molecular and cellular mechanisms by which adult tissue-specific stem cells acquire regenerative properties.
Her research proposes the well-known stem cell gene Cripto and non-muscle Myosin IIs are key regulators of regeneration.

Hoover tests her hypotheses in model biological systems, including two types of in vitro cultured mammalian epithelial cells: an in vivo model of zebrafish caudal fin regeneration and a novel ex vivo culture system derived from primary zebrafish blastemal stem cells.

Preliminary results demonstrate connections between Cripto and Myosin IIs for mammalian cells, as well as their function in adult zebrafish fin regrowth and wound healing. Additionally, Hoover has shown Myosin IIs are required for tissue regeneration in the zebrafish.

The researchers anticipate future studies will reveal a co-regulatory role for Cripto and Myosin IIs in regulating stem cell function in tissue regeneration in vertebrates. “This project has far-reaching potential to transform the way we understand the molecular regulation of tissue regeneration,” Dr. Kelber notes.

BRINGING IDENTITY CENTER STAGE THROUGH ‘JOINING THE SPECTRUM’

CSUN’s Teenage Drama Workshop, a 60-year-old summer theater program for 12- to 18-year olds, provided the perfect stage to explore theatre’s potential as an intervention for youth on the autism spectrum.

During a five-week intensive theatre conservatory, 18 youths with autism spectrum disorder and nine neurotypical peers worked together to create, rehearse, and perform an original musical called “Joining the Spectrum” under the creative direction of author and media personality Elaine Hall. The project allowed participants to view life on the spectrum through individual stories and shared experiences.

Led by Dr. Ah-Jeong Kim, professor of theatre, and Dr. David Boyns, professor of sociology and director of the Institute for Community Health & Wellbeing, and funded by a National Endowment for the Arts ArtWorks Research grant, the project raised awareness of autism and studied the importance of theatre as a liminal environment—an in-between space where individuals can explore, investigate, and restructure their sense of identity.

This innovative project brought together faculty researchers from three colleges with undergraduate and graduate student researchers, as well as volunteers from diverse disciplines. “Joining the Spectrum” was presented in five sold-out performances. Findings affirmed the transformative potential of theatre as a liminal art and found theatre can play an important role in increasing the self-esteem, empathy, and relationships of youth on the autism spectrum.

“Having a spectrum child who is now in college, I was so moved at the opportunity for the children on the spectrum to be fully included in the project,” an audience member said. “I couldn’t stop crying. Thank you and bravo.”
GROUNDBREAKING RESEARCH HAS NATIONAL IMPLICATIONS FOR PARKING POLICY

Professor Richard Willson in Cal Poly Pomona’s Department of Urban and Regional Planning has done groundbreaking work on parking policy and its impact on land use, urban development, transportation, and climate change. Dr. Willson’s research has culminated in two seminal books, “Parking Management for Smart Growth” and “Parking Reform Made Easy.”

In the field of urban planning, Dr. Willson’s work has provided a crucial link between transportation and land use, and his research may have far-reaching ramifications for parking policy.

Dr. Willson continues to conduct research in transportation policy, planning theory, and educational assessment. His work is funded by the U.S. Department of Transportation, the William & Barbara Leonard University Transportation Center at Cal State San Bernardino, and other granting agencies. He has served as a research associate with the Leonard Transportation Center and the Mineta Transportation Institute at San José State University.

“I have followed the work of Richard Willson for a decade and am aware of the influence it has had on scholars and practitioners of urban planning in Southern California and throughout the country,” says Dr. Martin Wachs, distinguished professor emeritus of the UCLA Department of Urban Planning. “His work represents a critical link in urban planning between transportation and land use, which is one of the most complex, contentious, and politically charged topics addressed by planners.”

EXPLORING WAYS TO STOP THE SPREAD OF MALARIA

Under the mentorship of Professor Peter Arensburger of Cal Poly Pomona’s biological sciences department, undergraduate student Jenny McCarthy was part of an international team that sequenced and assembled the genomes of 16 species of mosquitoes, some of which transmit malaria to humans. It is estimated that in 2012, the disease sickened 200 million people and killed more than 600,000.
Dr. Arensburger runs a laboratory focusing on bio-informatic questions, such as the abundance and characteristics of transposable elements in invertebrates and the regulation of these elements by small ribonucleic acid (RNA) molecules. “There is a drive to try and modify these mosquitoes artificially, that is, to try to genetically alter them so that they cannot carry diseases,” says Dr. Arensburger.

Future analysis of the genomes may produce clues as to why some species are more likely to transmit malaria than others, which could lead to better health practices and even to genetic engineering to prevent mosquitoes from spreading the disease among humans.

With funding from multiple sources, this massive project involved 72 institutions worldwide. Each of the 16 species studied contained between 10,000 and 17,000 protein coding genes. Previously, the entire genome was available for only the most infective species of mosquito, *Anopheles gambiae*.

TWEAKING SCIENCE TEACHING TO ENGAGE YOUNG STUDENTS

Cal Poly Pomona is involved in a number of teacher education initiatives, including Project Lead the Way (shown above), which is focused on K-12 engineering curriculum. Additionally, in 2014, the National Science Foundation awarded a five-year, $7.7 million grant to Cal Poly Pomona’s Center for Excellence in Mathematics and Science Teaching (CEMaST), to establish a new evidence-based program called Reinvigorating Elementary Science through a Partnership with California Teachers (RESPeCT).

This professional development program is a partnership with Pomona Unified School District and Cal Poly Pomona for testing innovative education techniques in math and science. Led by Professor Nicole Wickler, 10 Cal Poly Pomona professors are undertaking research with 168 Pomona Unified K-6 teachers and 7,500 students to develop new science curricula that is more engaging and challenging.

The trained teachers will then serve as mentors to other teachers—an effort that ultimately will benefit all the K-6 teachers and students in the district. A major innovation in the project will be the development of video-based learning resources and shared curriculum materials that integrate selected Common Core State Standards from mathematics and English language arts.

Another key to the program is collecting classroom videotapes of teachers teaching as a base for reflection/modification of the lessons and to assess teacher change in practice over time. There is also careful assessment of student learning and teacher content knowledge for both experimental and control groups.

The new techniques from this research will be assessed to determine their impact on the achievement gap between groups of students as defined by socioeconomic status, race/ethnicity, and gender. The program is showing remarkable success thus far, as student and teacher enthusiasm for math and science is rapidly growing in the Pomona school district.
BLOCKING HIV INFECTION AT THE MOLECULAR LEVEL

A four-year, $425,000 grant from the National Institutes of Health is helping Sacramento State students contribute to the fight against HIV.

The grant, recently awarded to Professor Katherine McReynolds in the Department of Chemistry, aims to synthesize complex dendritic carbohydrate-based macromolecules that could serve as a topical barrier between potential host cells and the HIV virus.

The goal is to find a group of molecules that can bind to protein structures on the virus surface, preventing it from invading and infecting potential host cells. Dr. McReynolds’ research specifically targets the GP120 protein, which masks the identity of the virus, thereby preventing its interaction with the target cell.

“I think it’s a great strategy that could potentially have a huge impact in decreasing the number of new cases of HIV,” says Dr. McReynolds. “It’s meant to be a preventative agent, something that can be used in advance of an HIV exposure.”

One of the benefits of the funding is that it will allow Dr. McReynolds to expand the number of students on her research team—adding at least two immediately with more to possibly follow.

“We really try to push the students to get that hands-on experience outside the classroom,” she says. “Having a strong research background can help them get that first job or get into a competitive graduate program.”

INVESTIGATING WOUND HEALING THROUGH STEM CELL MECHANISMS

This summer, Adam O’Neal will leave Sacramento State for Ithaca, New York, to begin a Ph.D. program in molecular and cell biology at Cornell University. For O’Neal, the road to becoming a stem cell scientist has followed a circuitous route through six campuses over 12 years. Yet, it was at Sacramento State that O’Neal was empowered to take a giant step forward in his academic career by helping advance applied stem cell research.

Alongside Biological Sciences Professors Thomas Peavy and Robert Crawford, O’Neal analyzed the utility of scaffolds seeded with stem cells for the healing of dermal lesions. Using mouse wound tissue that had been treated with human mesenchymal stem cells (MSCs) within a collagen scaffold, the researchers sought to determine whether...
low-oxygen treatment of MSCs would improve their wound-healing capabilities. After treatment, O’Neal investigated whether there was an increase in blood vessel development through immunohistochemical confocal microscopy analyses.

“Adam captured some of the most amazing fluorescent images of mouse blood vessel development within and around the edges of the collagen scaffold,” says Dr. Peavy. “He even developed a sophisticated 3-D mapping analysis to detect how deep the cells were found within the scaffold.”

The project eventually led to a co-authored paper for O’Neal that appeared in the journal, *Frontiers in Cell and Developmental Biology*, in 2015.

O’Neal credits his success to the culture of student support within the College of Natural Sciences and Mathematics. “Here, I was able to find my academic identity, both as a student and as a research scientist, due to a community of professors who are willing to foster potential,” says O’Neal.

**HELPING YOUNG CHILDREN WITH CEREBRAL PALSY LEARN TO WALK**

More than anything else, parents of children with cerebral palsy (CP) want their child to be able to walk. Through home-based training on small, portable treadmills, Dr. Katrin Mattern-Baxter, assistant professor in the Department of Physical Therapy, seeks to accelerate the onset of walking while decreasing reliance on assistive mobility devices such as a walker.

Dr. Mattern-Baxter’s work builds on an earlier study funded by the American Physical Therapy Association, in which she worked with two groups of pre-ambulatory children with CP. One group received once-a-week physical therapy, while the other group trained six days a week on the mini treadmills. On average, the treadmill-trained children were walking sooner and faster than their PT-only counterparts.

Dr. Mattern-Baxter incorporated her findings in STEPS (Supported Treadmill Exercise Program) at Sacramento State, funded by the Thrasher Research Fund and Easter Seals. Since 2013, STEPS has provided free treadmill training to 35 Sacramento-area kids with neuromotor impairment. Twice a week, children in the program learn to walk on miniature treadmills under the guidance of Dr. Mattern-Baxter and physical therapy students. The goal is that they will some day be able to walk on their own or with an assistive device.

Dr. Mattern-Baxter’s research comes at an opportune time. Limited funding means young children with CP receive physical therapy services just one to two times per week. STEPS allows children with CP to gain the greatest benefit from the time they do spend in therapy.
TEAMING UP TO IMPROVE ENGLISH LEARNERS’ MATH SKILLS

For English learners from preschool to high school, improving language skills is only part of the challenge. Mathematics continues to be a significant barrier for many seeking to graduate from high school and gain admission to college.

Teaching English Learners Early Mathematics (TEEM) wants students, teachers, and school leaders to seek success together—providing collaborative professional development and learning opportunities in tandem with educational enhancement tools for students.

TEEM is a partnership between Cal State San Bernardino, the Riverside County Office of Education, the Romoland and Nuview Union School Districts, Romoland Head Start, and state preschool programs. The partnership is built on intensive pedagogical study, preparing strategies ready for the school and classroom.

“Our goal is rigorous and replicable research that can be reproduced beyond this project,” says project evaluator Dr. Lorie Sousa. “The TEEM project has the potential to provide additional evidence that, if successful, will impact many students across California and beyond.”

The project is funded by a $3 million Department of Education i3 award with additional matching support from the Heising-Simons Foundation, Toyota USA Foundation, and the David and Lucile Packard Foundation.

UNDERSTANDING THE LONG-LASTING EFFECTS OF ANTIDEPRESSANTS

Many adolescents are prescribed antidepressants. Yet little is known about the potential for long-lasting consequences of these treatments, particularly on possible future drug abuse.

Lace Riggs, a graduate research assistant under the mentorship of Dr. Sergio Iñiguez in the Department of Psychology, uses animal models to examine whether adolescent exposure to a common antidepressant results in changes to the sensitivity of the rewarding properties of cocaine in adulthood. Riggs’ findings suggest that adolescent exposure to fluoxetine increases sensitivity to the rewarding properties of cocaine later in life.

Initially supported by funding from the National Institute of General Medical Sciences and the California State University Program for
Education and Research in Biotechnology, Riggs later received an NIH-funded fellowship from the Diversity-Promoting Institutions Drug Abuse Research Program, supporting her work in this area.

It was her experience as a bachelor’s- and master’s-level researcher at Cal State San Bernardino that led Riggs to pursue a Ph.D. in neuroscience. “Being involved in this project helped me realize the importance of basic/preclinical research in examining the safety of psychotropic drug exposure during early development,” says Riggs.

FORGING PATHWAYS TO A CAREER IN CYBER SECURITY

An award-winning cyber security camp program at Cal State San Bernardino empowers girls in middle school to consider a rewarding university education and a career in a field that is increasingly vital.

The five-day camp offers a unique opportunity for 250 girls from local disadvantaged middle schools and others within the Girl Scout community. The largest program of its kind in the United States, the camp is working to address the underrepresentation of women in cyber security and related fields. Every participant receives a computer to keep. For many girls, this was the first computer they have ever owned.

Google, Facebook, Sigmanet, MITRE, Northrop Grumman, the National Security Agency, and the Department of Homeland Security collaborate with faculty from the College of Business and Public Administration in partnership with the Girl Scouts of San Gorgonio Council to develop and offer this free program.

The project is funded through a seed grant of $100,000 from the National Science Foundation and the National Security Agency, smaller donations to assist with transportation, and equipment from corporate entities and the Girl Scouts.

This groundbreaking program earned national attention and a Certificate of Special Recognition from the United States House of Representatives.
UNDERSTANDING BRAIN CONNECTIONS IN AUTISM

In early childhood, the neurons inside a child’s developing brain forms connections between various regions in the brain.

Cognitive neuroscientists at San Diego State University found that in children and adolescents with autism spectrum disorder however, connections between the cerebral cortex and cerebellum appear to be overdeveloped in the sensorimotor regions of the brain. This overdevelopment appears to muscle out other connections serving higher cognitive functions.

SDSU psychologist Ralph-Axel Müller—working with Amanda Khan, a former master’s student at SDSU and now a doctoral candidate at Suffolk University in Boston—used fMRI brain imaging technology to home in on neuronal patterns in 56 children and adolescents, half with autism and half without the disorder.

The imaging results revealed the participants with autism had far stronger neuronal connectivity between sensorimotor regions of the cerebellum and cerebral cortex than their non-autistic counterparts. But the autistic kids and teens also tended to have less connectivity between regions involved in functions such as decision-making, attention, and language.

The study represents the first-ever systematic look at connections between the entire cerebral cortex and the cerebellum using fMRI brain imaging. Its findings could one day help researchers to develop a reliable brain-based test for identifying autism.

“We still don’t understand what in the brain makes a kid autistic,” Dr. Müller says. “You can’t look at a scan and say, ‘There it is.’ We’re doing the groundwork of finding brain variables that might be biomarkers for autism and its subtypes.”

INVESTIGATING HOW BACTERIA CROSS THE BLOOD-BRAIN BARRIER

The blood-brain barrier is a thin network of blood vessels with cells that border one another very closely, forming protein junctions too tight for bacteria and viruses to slip through. When the barrier is breached, though, the result can be bacterial meningitis, a frequently deadly disease caused when the brain becomes dangerously inflamed.
Using animal cell cultures, Dr. Kelly Doran and her student, Brandon Kim, are investigating how one type of bacteria, *group B streptococcus*, permeates the brain’s defenses.

The cells of the blood-brain barrier fire off a protective molecular signal as receptors along the blood side of the barrier detect the Group B strep bacteria. But exposure to the bacteria also induces a gene to produce a transcription factor protein that contributes to the breakdown of the barrier’s tight junctions. The cells in turn destroy the integrity of the barrier, permitting bacteria to enter the brain.

A better understanding of this process could allow scientists to develop therapeutics that temporarily control this reaction, thus preventing the self-destruction of the blood-brain barrier. Additionally, this knowledge might allow researchers to harness the process to design drugs that tell the blood-brain barrier to let them through so they can fight some brain diseases.

The research is funded by the National Institute of Neurological Disorders and Stroke.

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LEARNING ABOUT OURSELVES FROM ANCIENT CORAL

Coral reefs around the world are in decline. The tiny creatures that form these great structures provide a critical maritime habitat. In addition to ecological harm, the loss of coral would also deprive researchers of valuable clues about the origins of the animal kingdom.

These ancient creatures provide insight into human origins in ways that other experimental genetic models like flies and worms cannot. Funded through a grant from the National Science Foundation, San Diego State graduate student Steven Quistad has been analyzing the recently sequenced genome of *Acropora digitifera*, a coral that looks like a mound of miniature Christmas trees.

Quistad discovered the coral showed greater similarities to human genes that affect tumor suppression than the genes of fruit flies and worms. These findings refute the concept of coral’s simple beginnings and increasing evolutionary complexity.

“This is part of a really cool shift that’s happening in evolutionary biology,” Quistad says. “We’ve learned a lot from flies and worms, but they have led us to these erroneous conclusions about the evolution of all animal life. If we saw something in flies and worms, it should be even simpler in a more ancient organism like a coral. But corals are actually more similar to humans in multiple ways. Corals have a lot more to teach us.”
FOCUSBING ON THE INTERDISCIPLINARY APPLICATIONS OF OPTICS

Professor Zhigang Chen’s research focuses on the interdisciplinary fields of nonlinear optics, biophotonics (combining biology, optics, and photonics), and material sciences.

Dr. Chen’s ongoing research includes using optical beams to control or guide microparticles, biological samples, surface electromagnetic waves, and electric discharges. He has even developed photonic structures that mimic the behavior of graphene. This research is unique because it applies fundamental science beyond the field of optics and photonics.

This wide-ranging application integrates the expertise of a diverse team of faculty and students in physics, chemistry, biology, and environmental science. This core team develops active collaborations with world-renowned experts in the field of optics and photonics.

“I spent more than six years in Professor Zhigang Chen’s optics research laboratory,” says Anna Bezryadina, now a postdoctoral fellow at UC San Diego. “Professor Chen is really like my ‘scientific father,’ and the experience and accomplishment I gained while working with him simply transformed my entire career.”

UNDERSTANDING CELL DIFFERENTIATION AND PLASTICITY IN EMBRYOS

The goal of undergraduate student Krissie Tellez’s research is to better understand how specific cell types arise during early development of embryos, especially the in vivo factors that influence cell differentiation and plasticity.

Through transplantation experiments with a model species of frog, Tellez showed that prospective neural cells are responsive to location and time-specific muscle-inducing signals. This provided new insights into the ability of the embryo to regulate cell plasticity during development.
Cells from the frontal neural region lose their ability to change their fate after the earliest phases of embryonic development. But cells in other regions are able to alter their development and form muscle fibers, much later. Put another way, anterior neural ectoderm cells lose their plasticity earlier during development than posterior neural ectoderm cells.

Tellez is now studying developmental biology at Stanford University. Her research is funded by the Beckman Foundation and the National Institutes of Health.

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**BRIDGING THE DIVIDE BETWEEN URBAN YOUTH AND PUBLIC LANDS**

According to the U.S. Census, there are approximately 33 million teenagers ages 13 to 19 across the nation. But over the past decade, fewer teenagers are involved in organized outdoor programs—a fact that’s especially true for urban youth.

Graduate student Tanvi Sikand, who is studying broadcasting, joined a multidisciplinary team to engage urban Bay Area youth in outdoor recreation experiences by using their creativity as media producers to convey positive information about the region’s forests, parks, and other natural areas. Upon completion, the team had produced 13 videos about the outdoors.

Sikand’s study showed that young people are more likely to find the messages engaging, relevant, and persuasive when they are produced by their peers.

“I had very little idea of what I was in for and was awesomely surprised,” says Ramiro Villalvazo, director of Recreation, Lands, Wilderness and Special Uses for the U.S. Forest Service Pacific Southwest Region. “The production was fun, exciting, and spoke young people’s language about the ‘coolness’ and adventure of spending time outside.”

SF State partnered with Bayview Hunters Point Center for Art and Technology, a local nonprofit organization that educates, empowers, and employs diverse youth and young adults from historically underserved neighborhoods of San Francisco and the Bay Area.
DATA MINING LEADS TO GALACTIC DISCOVERY

San José State undergraduate students Michael Sandoval and Richard Vo search for new galaxies by poring through public data sets, including observations from the Hubble Space Telescope.

Under the supervision of Assistant Professor Aaron Romanowsky, Vo discovered the densest known galaxy. Shortly thereafter, Sandoval discovered an even denser object—so unusual it was put in a class of its own: a hypercompact cluster.

These discoveries were reported in *The Astrophysical Journal Letters*. The students also went to Hawaii to participate in a follow-up of their discoveries using the world’s largest telescope at the W.M. Keck Observatory. Both students have gone on to graduate school to study astrophysics.

The success of this project has motivated the development of new curricula in data science, training other student researchers in data mining and preparing them for the data avalanche anticipated from the next generation of observatories.

Prepared by the experience of working with Dr. Romanowsky, Sandoval is now pursuing a Ph.D. in physics at the University of Tennessee, Knoxville. Vo is pursuing a master’s in physics at San Francisco State.

Dr. Romanowsky continues to mentor students in this type of study. “The combination of a good idea, the students’ perseverance, and the use of public data resources is a great way to engage undergraduates in frontline astronomical research,” he says.

BETTER UNDERSTANDING THE PREHISTORY OF CARIBBEAN PEOPLES

Chris Keith, a master’s student in anthropology, participated in Anthropology Associate Professor Marco Meniketti’s summer program on the island of Nevis, in the Caribbean. During the trip, Keith studied the remains of a prehistoric female to better understand the lives and settlement dynamics of indigenous pre-contact Caribbean peoples.

“Chris’ work was highly significant in terms of the broad panorama of indigenous peoples of the Americas and provided a unique case study of a poorly understood historic population,” says Dr. Meniketti. “His efforts to recover, document, and fully study the remains have important ramifications in the study of settlement dynamics of the Americas.”

Scholarly opportunities and publications for both Keith and Dr. Meniketti resulted from their experiences; these came about through the Field
School, a unique faculty-led study abroad program that provides students with experience investigating the intersections of historical and prehistoric landscapes.

Students at the Field School contribute directly to research on issues such as slavery and environmental change, while living abroad and immersed in local culture. Students are instructed in and conduct every phase of archaeological survey and mapping, excavation, the recovery and analysis of artifacts, and synthesizing data collection with historical knowledge.

**Photo title:** *My faith on my face*

**Narrative:** *So I have some stickers on my face. These stickers have some writings; Prophet Mohammad narratives. Those narratives have different meanings about the importance of work in our life, about being good and cooperative to people, about giving money to the poor, and about not harming people. My mind is always occupied with thinking about how I can reflect my culture and religion to the American community. I’ve been taught totally different from what is being perceived in this country. Those stickers push me forward to think about a positive way to explain my culture and religion!*

*Moodi, Palestinian American Muslim man*

COMBATING HATE THROUGH EMPOWERING IMAGES AND DIALOGUE

Hate violence toward Arab, Muslim, and Sikh communities markedly increased after September 11, 2001. Nearly 15 years later, those identified as or perceived to be Arab or Muslim continue to experience prejudice and hostility.

In 2012, a series of hate ads—protected as First Amendment speech—were sponsored by the American Freedom Defense Initiative and placed on regional public transportation. Those ads prompted a community-based participatory research project to explore the experiences of those coping with Islamophobia and anti-Arab prejudice.

With direction from San José State Professor Edward Mamary, community participants took photographs representing their everyday experiences of Islamophobia and anti-Arab prejudice. These images served as a basis for discussions about responding to prejudice and discrimination with resilience, cultural pride, and self-determination. The project made its debut on April 2, 2015.

“At the conclusion of the project, the community was proud of how it demonstrated not only the heart-wrenching pain caused by these ads but also the amazing strength of the community to rise to the challenge of supporting one another,” notes Theresa Sparks, executive director of the San Francisco Human Rights Commission.

Partners included the Council on American-Islamic Relations, Asian Law Caucus, Arab Cultural and Community Center, Islamic Networks Group, Sikh Coalition, the San Francisco Department of Public Health, and the San Francisco District Attorney’s Office. The project was funded by the San Francisco Municipal Transportation Agency, the San Francisco Human Rights Commission, and the San Francisco Department of Public Health.
LAUNCHING SATELLITES AND STUDENTS’ CAREERS

The CubeSat Research Program, a broad, long-term, multi-agency effort, aims to increase the number of scientific discoveries by reducing barriers to space exploration and providing hands-on learning on an international scale.

By standardizing satellite configuration and delivery, the CubeSat program also provides easier access to outer space. This has enabled non-traditional space companies, such as PlanetLabs and Google’s Skybox, to create viable business models.

As a co-inventor of the CubeSat standard, Professor Jordi Puig-Suari, along with Assistant Professor John Bellardo, enables multidisciplinary student teams to work with NASA and the Department of Defense to design, build, and fly satellites.

For example, on the IPEX mission, students collaborated with NASA’s Jet Propulsion Laboratory to validate image processing algorithms and autonomy to be used on Earth-observing satellites.

Many alumni have gone on to start their own companies and become experts in the small satellite arena.

“Being a part of CubeSat for the last three years has given me more hands-on experience with satellite hardware and multidisciplinary cooperation than I expected in my undergraduate career,” says student researcher Nikolaus Powell. “This has allowed me to discover my own topics of interest and anticipate my best path forward after graduation.”

DEVELOPING NEW TOOLS FOR INTERACTIVE COMPUTING

Project Jupyter is a set of free, open-source software tools for interactive computing. These tools support reproducible and collaborative scientific computing and data science across a wide range of programming languages.

The project, which emerged from Cal Poly San Luis Obispo and UC Berkeley and is still led by both, is being embraced by numerous academic and industry data science teams. New features are in development to
enable distributed teams to generate computational narratives that include data analysis, predictions, visualizations, and simulations.

The project is the foundation for the web-based Jupyter Notebook. Over the past three years, Jupyter Notebook has become one of the most popular interactive computing environments, with more than three million users from academia and industry.

Further development of Project Jupyter is funded in part by a three-year, $6 million grant from the Leona M. and Harry B. Helmsley Charitable Trust, the Gordon and Betty Moore Foundation, and the Alfred P. Sloan Foundation. The project has also received significant donations from Microsoft, Google, and Continuum Analytics.

Other participants include Rackspace, Continuum Analytics, Bloomberg, IBM, and more than 400 individual contributors worldwide, as well as numerous Cal Poly students in physics, computer science, and design.

MAKING THE STATE LEGISLATURE MORE TRANSPARENT

Digital Democracy is a first-of-its-kind, web-based tool to transcribe videos of legislative hearings and make the transcriptions readily available to users. Sophisticated metatags attached to the transcripts enable both quick searches and in-depth analytics. A robust database also tracks individual participants’ positions, donations, and gift histories.

This innovative, student-built project is a product of the Institute for Advanced Technology and Public Policy at Cal Poly San Luis Obispo. Digital Democracy has also been discovered and shared on social media by journalists, advocates, and mobilizers. These legislative hearing video clips provide dynamic content for grassroots organizations, online media outlets, bloggers, professional associations, and government watchdogs.

Funded by $4 million in grants from the Laura and John Arnold Foundation and a $165,000 grant from the Rita Allen Foundation, Digital Democracy was deployed free to the public in May 2015 to provide searchable video files of available California state legislative hearings.

To date, Digital Democracy has transcribed more than 1,000 hearings representing over 2,000 hours of testimony.
Associate Professor of Physics Gerardo Dominguez is conducting laboratory experiments at Cal State San Marcos that attempt to recreate the physical and chemical conditions in the earliest days of our solar system.

Dr. Dominguez’s experiments will help better explain the origins of water in the solar system, including the Earth’s oceans. With funding from NASA, the study aims to determine, among other things, whether water formation predates solar ignition and the effects of early water formation on the relationship between terrestrial planets and the sun.

“The research Dr. Dominguez has proposed is important,” notes his post-doctoral mentor, Dr. Mark Thiemens, dean of the Division of Physical Sciences at UC San Diego. “The issue of the formation of water in the solar system is a basic one for understanding the origin of life and the evolution of planetary atmospheres, yet its chemical formation and processing is poorly understood at best.”

Infectious diseases in freshwater environments are a major concern for medical, veterinary and conservation efforts worldwide. Many pathogens of humans and wildlife depend on these freshwater ecosystems.

However, our understanding of many freshwater pathogens is limited. Therefore, a better understanding of the molecular mechanisms of immune evasion and pathogenicity may provide insight into how freshwater viruses spread and cause severe, life-threatening illness.

Undergraduate student Hector Galvez’s research aims to identify and characterize viral genes that influence the virulence of a ranavirus, a class of viruses that infect cold-blooded vertebrates, including fish, amphibians, and reptiles.
Under the supervision of Dr. James Jancovich, assistant professor of biological sciences, Galvez’s project hopes to identify the ranavirus genes involved with viral pathogenesis by generating knock-out viruses with selectively deleted target genes. These modified viruses are then characterized in cell culture and in the virus’ natural host, tiger salamanders.

This NIH-funded project provides an ideal model for students to learn virology, immunology, and host-pathogen interactions without the complications of studying a mammalian pathogen or using a non-native host species.

“Working in Dr. Jancovich’s laboratory has allowed me the opportunity to create new knowledge in the field of biology,” Galvez notes. “This laboratory work has not only set the foundation for my life as a research scientist, but has paved the way for a future in a multitude of scientific fields.” Galvez will begin a doctoral program at UCSD in the fall.

IDENTIFYING MENTAL HEALTH NEEDS FOR FARMWORKER FAMILIES

Mothers and young children of Mexican farmworker families are particularly vulnerable as they are often living in impoverished conditions and exposed to toxins as well as numerous sociocultural challenges.

With seed money and a community engagement grant from Cal State San Marcos, researchers are examining experiences of acculturation, stress, and maternal depression, along with children’s emotional and behavioral difficulties, among farmworker families in North San Diego County. The research is being conducted with the assistance of local community leaders (promotoras), the university’s National Latino Research Center, and North County Health Services.

Under the direction of Dr. Sara Bufferd and Dr. Kimberly D’Anna-Hernandez, assistant professors of psychology, students are gaining valuable research skills through the process of data collection, analysis, and presentation of findings. These findings will provide essential data to North County Health Services, helping to inform prevention and intervention programs, while contributing to the development of maternal and child mental health policies.

“I believe our work reflects an important and novel effort toward identifying mental health difficulties in this population, many of whom may be suffering in silence,” says program director Luzmam Vigil of North County Health Services.

Cal State San Marcos researchers hope to better understand mental health disorders among Mexican farmworker families, in particular those of mothers and young children.
BENEFITING SCIENCE AND CONSERVATION THROUGH BETTER SATELLITE IMAGERY

Dr. Matthew Clark, associate professor of geography and global studies at Sonoma State, received NASA funding to study the potential of NASA's planned hyperspectral satellite to improve regional-to-global scale mapping of land cover.

Traditional imagery data from Earth-observation satellites have limited measurements of the electromagnetic spectrum, which hinders their use in understanding our planet's biogeochemical cycles and ecosystem health and services. Hyperspectral sensors, or imaging spectrometers, can detect myriad biochemicals and structural properties in vegetation canopies. This information can improve assessment of land cover and change, such as shifts in vegetation types due to climate change, fire, or drought.

Dr. Clark’s research is designing a hyperspectral image processing framework based on machine learning and simulated imagery from NASA’s airborne hyperspectral sensor. This processing framework will lay the foundation for producing improved land-cover maps from a future hyperspectral satellite.

“I am interested in the conservation of earth’s biological diversity and ecosystem functioning in a time of increasing economic activity and global climate change,” says Dr. Clark. “Investigating, monitoring, and managing environmental change requires advanced satellite sensors and data processing techniques to provide a systematic and temporal perspective of the Earth at regional-to-global scales. My project, and related NASA-funded research in this field, will demonstrate how hyperspectral measurements from space can improve Earth system monitoring and forecasting.”

ADVOCATING FOR CHILDREN ON THE AUTISM SPECTRUM

Sociology student and McNair Scholar Jennifer Duenas’ study into the ways in which parents advocate for their children on the autism spectrum, is both scientific and personal. Drawing on her own experience raising two young sons with autism, Duenas conducted in-depth interviews with parents from different backgrounds and socioeconomic classes to determine how they work with the public school system to advocate for their children.

Duenas’ research aims to explain how the experience of children and parents following a diagnosis of autism is shaped by institutional arrangements and requirements, as well as available resources. While autism awareness has increased, anticipated outcomes from this research...
would include potentially novel solutions and strategies for parents of autistic children and their educators.

“The project has provided an opportunity to better identify the challenges parents face as they advocate for their children, the educational challenges autistic students face, and why these challenges exist in the first place,” says Duenas. “Working on this project has helped me develop my own advocacy skills as I navigate the public school special education system for my own two autistic boys.”

The project has become a starting point for Duenas’ doctoral studies in sociology at the University of Kansas.

ADDRESSING KEY WATERSHED CONCERNS

The Watershed Academics to Enhance Regional Sustainability (WATERS) Collaborative is an innovative program that engages faculty and students in projects that address regional watershed management issues.

Coordinated by Sonoma State’s Center for Environmental Inquiry, WATERS provides financial support and connections for faculty to engage their students in open-ended, real-world projects. Every year, WATERS engages 380 students in multidisciplinary study with faculty from 12 departments in three schools.

Funds are provided to faculty to support integration of watershed topics into existing courses. Students undertake this watershed-related coursework, internships, and graduate research. Results from cumulative student projects are presented to community partners during end-of-year symposia.

Now in its fourth year, WATERS is funded by the Sonoma County Water Agency contract with the Center for Environmental Inquiry. Also involved are Cal State Monterey Bay, the UC Davis Bodega Marine Reserve, multiple cities, nonprofit organizations, consultants, and utility companies.

“Students coming out of Sonoma State now have a skill set that is above and beyond some of the other skill sets I’ve seen coming out of other schools,” notes Keenan Foster of the Sonoma County Water Agency. “The professional experience they’re getting really gives them a leg up in being able to get a job in this competitive marketplace.”

The WATERS project estimates water use for new development projects.
BOOSTING AGRICULTURE PRODUCTION THROUGH MICROBIOLOGY

Research conducted by a team of Stanislaus State students, led by Associate Professor of Microbiology Choong-Min Kang, could help cut agriculture costs and speed up production of a vital ingredient in livestock feed.

Dr. Kang and his team researched L-threonine, an important amino acid in livestock diets. L-threonine is produced via a biosynthetic pathway involving the enzyme ThrB. The challenge in Dr. Kang’s research was to maximize L-threonine production while avoiding the feedback inhibition, or slowdown effect, that occurs when L-threonine accumulates in an organism. For this study, that organism is *Escherichia coli*.

Past attempts by other researchers to remove the feedback inhibition in ThrB failed because any mutation also killed the enzyme’s catalytic ability. However, based on the 3-D structure of ThrB, Dr. Kang and his team found a specific amino acid change that eliminates the feedback inhibition without losing the catalytic activity.

Participating in this research were Stanislaus State undergraduate students Erik Larsen, Kristina Kozlov, Carla Antypas, Juan Montalvo, Paul Cordova, and Rebekah Dial; postdoctoral scholar Dr. Younghwa Kim; and visiting student from Korea, Sung-Kwon Lee.

“Nothing reinforces the concepts learned in a classroom like the actual real-life experiences one may obtain while working in a laboratory,” says Antypas. “Working on a project such as this one, and working on a research team, is an invaluable experience that any student who is interested in science should have.”

MONITORING THE SPREAD OF INVASIVE AQUATIC SNAILS

Stanislaus State graduate student Christina Robinson is studying the distribution and population dynamics of the New Zealand mud snail, a non-native species that has invaded the United States over the past few decades.

In 2012, the mud snail was discovered in Marin County’s Corte Madera Creek. By sampling streams in the vicinity, Robinson is comparing the current aquatic community composition to historical data to determine how far the snail has spread and its effects on other aquatic animals, as well as the snail population’s susceptibility to drought and floods.
A consortium of local water, watershed, and fish and wildlife authorities are collaborating to identify and manage aquatic invasive species in local streams. This consortium has teamed up with the university to initiate early detection surveys for invasive species in three streams that support endangered and threatened coho salmon and steelhead fish.

“An infestation could seriously alter the stream habitat and lead to the eradication of coho and steelhead,” says Greg Andrew, fisheries program manager for the Marin Municipal Water District. “The surveys by Christina Robinson and the Stanislaus State team are vital to controlling the spread of these invasive species and helping protect these streams as habitats for our native species.”

Wellness WORKs! is a local partnership between Stanislaus State, San Joaquin County Mental Health Services, and the county’s Human Services Agency. Since 2000, the university has provided one-week and three-week holistic courses with the goal of moving participants from welfare to wellness to work.

To date, the program has served more than 10,000 welfare recipients. For those participating, short-term goals are to foster positive self-esteem, improve self-care, and enhance personal empowerment and well-being. Long-term goals include supporting re-entry into the work world, increasing success as employed citizens, and improving their lives.

Research undertaken by Dr. Carolyn T. Martin, associate professor in the School of Nursing, and her students focuses on the experiences of program participants, instructors, and students. The research seeks to understand the effects of the community-based welfare-to-wellness-to-work program through rigorous data collection and evaluation, providing a solid basis for program improvement and new programs that may be offered in the future.

“Participants leave the program better prepared to develop, sustain, and complete long-term vocational plans,” says Wellness WORKs! Assistant Director Heidi Britt.
I hope you enjoyed the exemplars of CSU research, scholarship, and creative activities. We are taking this opportunity to celebrate CSU research and acknowledge contributions from the 23 campuses and multiple affinity groups within the university. CSU teacher-scholars conduct cutting-edge research and educate more than 475,000 students. Faculty research addresses fundamental science, applied research, and research with societal impact. The CSU brings in $500-600 million per year in external support for sponsored research and programs, with total standing assets from awarded grants and contracts exceeding $2 billion. In the last two years, CSU scholars have authored more than 15,000 publications. The majority of CSU research papers have student coauthors.

At the CSU, research enables and connects student success, faculty/student scholarship, faculty career development, knowledge renewal, and intellectual property creation, and it enhances the economic development of the region.

Our research topics are diverse, ranging from better agricultural production through microbiology to CSU’s participation in a consortium that inaugurates a new era of astronomy with direct detection of gravitational waves produced when two black holes collide. In addition, our faculty participate directly in preparing new school teachers, advocating for children on the autism spectrum, making state legislature more transparent, and addressing issues relating to climate change and California’s drought.

Clearly, our work extends beyond traditional disciplines and into emerging, multi-disciplinary areas where we devise innovations to solve the problems of California, the nation, and the world. As we move forward, we seek to use research as a tool for student engagement and skills development, thereby improving student retention and graduation rates. Research should be a vehicle to ignite passion for knowledge and to teach perseverance skills.

At the CSU, we also seek to create new opportunities for projects that benefit the public, enhance economic development, and apply theoretical concepts to practical outcomes with significant societal impact. We also seek to promote faculty and student diversity in underrepresented disciplines and grow research that provides knowledge renewal and scholarship for faculty.

Chancellor Timothy White and Executive Vice Chancellor Loren Blanchard are tremendous champions of this work and encouraged us to demonstrate the impact of research in the CSU. Our sincere thanks to Dr. Zed Mason for initiating the creation of this research brochure as well as to the campus chief research officers and affinity group directors (listed on next page) and the production team (listed to the right) for realizing this vision.

We invite you to stay abreast of new research developments at www.calstate.edu/research

Ganesh Raman
Assistant Vice Chancellor for Research

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- **Polly Huggins**, Administrative Analyst for Research

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- **COUNCIL ON OCEAN AFFAIRS, SCIENCE & TECHNOLOGY (COAST)**: Dr. Krista Kamer, Director
- **CALIFORNIA STATE UNIVERSITY PROGRAM FOR EDUCATION AND RESEARCH IN BIOTECHNOLOGY (CSUPERB)**: Dr. Susan Baxter, Executive Director
- **DESERT STUDIES CONSORTIUM (DSC)**: Dr. Darren Sandquist, Chair
- **INSTITUTE FOR PALLIATIVE CARE**: Helen McNeal, Executive Director
- **MOSS LANDING MARINE LABS (MLML)**: Dr. James T. Harvey, Director
- **OCEAN STUDIES INSTITUTE (OSI)**: Dr. Christopher Lowe, Director
- **SOCIAL SCIENCE RESEARCH AND INSTRUCTIONAL COUNCIL (SSRIC)**: Dr. Stafford G. Cox, Chair
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