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Pictured on the cover photo: Karnveer Gil, Sophia Romeu, and Sara Mesgun in Dr. David Quintero’s research lab in the School of Engineering.
Welcome to the College of Science & Engineering at San Francisco State University! After two years of serving in the role in an interim capacity, I’m thrilled and honored to have been chosen as the new dean of the college. I will be bringing more than 20 years of experience at SF State to this position. I have worked closely with our department chairs as well as with our campus leadership to help support the excellent work our faculty and staff are doing to advance the educational experiences of all students.

There’s a lot to be excited about in the college. This year we’ve hired 13 tenure-track faculty who bring new expertise in far-ranging subjects, including galaxy formation, drug discovery and Internet of Things technologies. Our degree programs remain as popular as ever, with Engineering, Computer Science, Psychology and Biology among the top 10 undergraduate majors on our campus.

CoSE continues to improve program offerings to ensure that our students can take advantage of new and exciting opportunities. Our first-in-the-country Graduate Certificate in Ethical Artificial Intelligence, a collaboration with faculty in the College of Business and Liberal & Creative Arts, will prepare students to work in emerging technological fields with the good of society in mind. Meanwhile, a new M.S. in Statistical Data Science program will train our students with skills that are increasingly in demand in the tech workforce.

A testament to the high caliber of our faculty is their ability to continue to attract significant external funding. During the 2018-2019 academic year, faculty were awarded over $12.5 million in new grants, with the largest number of grants coming from the National Science Foundation and the National Institutes of Health.

New initiatives like our PINC (Promoting Inclusivity in Computing) and GOLD (Graduate Opportunities to Learn Data Science) programs, funded by NSF, as well as the SF BUILD program, recently renewed by the NIH for an additional five years, demonstrate the commitment of our faculty and staff to making science more inclusive by improving the way we teach and mentor students in our programs. These efforts are paying off as SF State is among the top universities in the nation for awarding STEM degrees to underrepresented students across several departments.

And as we look ahead to the next academic year and to CoSE’s future, we’re excitedly planning a new academic building that will house our growing engineering and chemistry and biochemistry programs. Importantly, this new 150,000-square-foot building will provide innovative research and instructional spaces with the goal of welcoming students from across the campus to learn about science and technology.

By bringing together SF State’s social justice mission with our college’s strengths in science and technology, CoSE graduates are uniquely prepared to address some of the world’s most pressing issues. I hope you’ll read on to learn more about the impressive accomplishments and ambitious plans of our faculty, staff, students and alumni.

Sincerely,

Carmen Domingo, Ph.D., Dean
College of Science & Engineering
FACULTY ACHIEVEMENTS AND RESEARCH

CoSE faculty perform cutting-edge research on topics of critical importance and are recognized for their work locally, nationally and worldwide. Here are just a few of the faculty’s achievements over the last year spanning medicine, climate change, diversity in science and more, many of which were highlighted on the University’s SF State News website.

One recent study from a team including Professor of Biology Zheng-Hui He tackled food insecurity by targeting an inefficiency in how some types of plants photosynthesize. The team figured out a way to use genetic engineering to streamline the process and substantially increase the productivity of rice plants, which they published in the journal *Molecular Plant*.

Another paper from the lab of Professor of Physics and Astronomy Zhigang Chen, published in the *Nature* journal *Light: Science & Applications* in March, has implications for medicine. The paper shows that under certain conditions, lasers can cause fluid containing blood cells to act like a fiber-optic cable, preserving the focus of a laser beam and allowing it to shine through unimpeded — a finding that could lead to new medical diagnostic techniques.

Other CoSE faculty focused instead on environmental health. Professor of Biology Gretchen Lebuhn was part of a team that performed a 2016 assessment of the world’s biodiversity organized through the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystems Services. The results of her work, detailing worldwide cultural knowledge about pollinators, was published in the journal *Nature Sustainability* in 2019, and is the first assessment of its kind to incorporate indigenous knowledge. Assistant Professor of Earth & Climate Science Zan Stine published a new mathematical technique for extracting historical climate data from tree rings in the journal *Paleoceanography and Climatology*, work that could help scientists better understand our warming world. And Biology faculty member Edward Carpenter along with Chemistry & Biochemistry faculty members Tomoko Komada and Peter Palmer recently co-authored a paper in *Science of the Total Environment* revealing how biofilms affect the accumulation of chemical pollutants on marine plastic.

The work of CoSE faculty isn’t going unrecognized. Professor of Mathematics Federico Ardila received a prestigious 2019 Simons Fellowship in Mathematics, the only awardee from "I’ve personally seen starvation, people really hungry. As plant biologists, we have an obligation to do something about it.” — professor of Biology Zheng-Hui He

A recent study co-authored by Professor of Biology Zheng-Hui He showed it’s possible to tweak rice genes to increase the plant’s productivity.
A still from an animation from the lab of Professor of Physics & Astronomy Zhigang Chen, showing red blood cells collecting along the path of a laser.

Credit: Light: Science & Applications
ADVANCES IN EDUCATION

“We like to show that computer science isn’t abstract — it’s related to what students want to do. Showing those connections makes a huge difference.”
— Ilmi Yoon, professor of computer science

Students in an SF State science classroom discuss the course material.

Ilmi Yoon, professor of computer science
Innovation in CoSE
extends outside of the research lab — faculty and staff in the college are on the forefront of research and adoption of educational techniques to give students the tools to succeed in the classroom.

One study, in press at the journal CBE – Life Sciences Education, involved 77 co-authors, including 36 from the University’s Department of Biology. The study investigated “instructor talk,” in which instructors discuss non-course material in the classroom. The team studied instructor talk in over 60 different courses, developing a way to categorize and measure the phenomenon so its effects on student learning can be rigorously studied. It developed out of a three-year professional development effort in the department, after which participants reported positive effects on their teaching and a greater sense of belonging in the department.

Lead author Kimberly Tanner, a biology professor, also published a paper in the journal Science Advances detailing how faculty with education expertise are increasingly embedded in science departments in the CSU system as part of efforts to improve the way science is taught. Over the past 10 years, the team found, the number of such positions in the CSU system increased by more than 50%, underscoring large-scale efforts in the system to improve the teaching of science.

Meanwhile, Professor of Computer Science Ilmi Yoon was co-Principal Investigator on a $400,000 NSF INCLUDES Alliance grant through the Computing Alliance of Hispanic-Serving Institutions to increase the retention and graduation rates of students from Hispanic backgrounds pursuing associate or baccalaureate degrees in STEM. The program will also provide valuable insight into institutional and teaching practices to better serve Hispanic students in computing and other STEM disciplines, and will include the opportunity for students to participate in a residency at the Google campus in Mountain View.

CoSE’s focus on improving education extends to program offerings as well. The fall 2019 semester saw the launch of the Graduate Certificate in Ethical Artificial Intelligence, one of the only programs of its kind in the country. Led by Professor of Computer Science Dragutin Petkovic along with colleagues in the College of Business and the College of Liberal & Creative Arts, the certificate aims to give students a comprehensive understanding of autonomous decision-making while also exploring the thorny ethical issues raised by the technology. Students in the certificate will take three courses, covering AI algorithms and software systems along with business ethics and philosophy, and complete a research paper on an issue in AI Ethics. The forward-thinking nature of the program has attracted coverage from news outlets like the Economist and the Wall Street Journal.
CoSE students excel in research and scholarship, and go on to make important contributions to the Bay Area and around the world.

The college chose two students to represent CoSE at the University’s 118th Commencement ceremony in May. Chloe Zirbel graduated with a B.S. in Computer Engineering, and during her time at SF State conducted research focused on developing a low-cost, interactive virtual reality system to aid the rehabilitation of stroke survivors — work for which she took a first place award in the 2018 CSU Research Competition. Jodi McWhirter, who received an M.A. in mathematics, focused on the field of combinatorics and went on to a Ph.D. program at Washington University in St. Louis. Outside of her research, McWhirter held officer roles in Mathematistas, a group working toward gender equity in math.

In 2019, the college also boasted two first-place winners in the CSU’s annual Student Research Competition: Julia Moon, a Psychology master’s student whose research covers the link between time perception and anxiety in adolescents, and Brandon Van Over, a Mathematics master’s student whose work resulted in a mathematical proof for simplifying a problem that’s relevant to widely used programming algorithms.

Other CoSE students conducted and published cutting-edge research. In a summer at the SETI Institute, Physics & Astronomy major Andrew Garcia helped engineer a web-based tool called Technosearch that collects and organizes studies in which scientists searched the stars for traces of alien technology. Garcia presented the work at the 233rd meeting of the American Astronomical Society.

And Morgan Meyers, a recent alumna, was among those who published their masters’ theses in an academic journal.
“We are living in a time of great technological wealth. There is so much opportunity to provide aid and enrichment to consumers whose primary goal is not simply entertainment but physical recovery and well-being.”
— Chloe Zirbel (B.S., 2019)

Meyers’ research showed that ocean acidification may make important kinds of plankton less nutritious, a shift that would have a big impact on fish and other marine animals we eat. She published the work in the journal *PLOS ONE* in May.

Student organizations, too, continue to reach new heights. This year’s “SF Hacks,” the largest collegiate hackathon in San Francisco, drew over 450 student competitors from across the country and Canada, the best-attended yet. A team of six students organized this year’s event, including Computer Science major Michael Swanson and Computer Engineering major Madeline Schmoll.

Mathematics master’s student Brandon Van Over

Psychology master’s student Julia Moon
DIVERSITY AND INCLUSION

"We want to disrupt current practices in science to create the space for new ones that are inclusive of all students."
— Leticia Márquez-Magaña, SF BUILD director and professor of Biology

CoSE serves a diverse body of students, and its faculty and staff are committed to promoting and improving equity in science. The NIH-funded SF BUILD program, which was recently renewed for an additional five years, supports a number of far-reaching efforts to diversify the biomedical workforce. One SF BUILD-supported initiative, the Alma Project, aims to make science classrooms more welcoming for students from underrepresented groups through reflective journaling. The intervention, led by students Khanh Tran and Imani Davis, expanded to reach over 1,800 students in the spring 2019 semester.

A new graduate certificate program, Graduate Opportunities to Learn Data Science (GOLD), will teach biology and chemistry master’s students data science skills. The program, funded through a $500,000 National Science Foundation grant with Assistant Professor of Biology Rori Rohlf as principal investigator, is a collaboration between faculty in the departments of Chemistry & Biochemistry, Biology and Computer Science and will focus on curricula and teaching methods shown to be supportive of students from historically underrepresented groups.
Several recent computer science diversity initiatives have also received NSF support. The Promoting Inclusivity in Computer Science program (PINC) program, led by Professor of Computer Science Ilmi Yoon, aims to help retain women and underrepresented students in the discipline. PINC includes a newly designed minor as well as new faculty and student mentoring programs, and received $1.3 million in support from the NSF. The first group of 20 PINC students graduated in Spring 2019. And the CS4SF program, led by Assistant Professor of Computer Science Hao Yue, received a $1 million grant from the NSF and offers training and support for K-12 computer science teachers, including a weeklong “Summer Institute” where San Francisco Unified School District teachers can learn specialized computer science knowledge as well as teaching techniques that help retain underrepresented students.

The impacts of this focus on diversity in science extend beyond SF State. Professor of Physics & Astronomy Kim Coble was part of a 2018 task force convened by the American Astronomical Society to find ways to increase the participation of underrepresented groups in astronomy Ph.D. programs. Coble and her colleagues presented their findings at the American Astronomical Society’s 2019 annual meeting, discussing the extent of the problem and laying out a number of recommendations to Ph.D.-granting departments. One such recommendation was to build connections with institutions that serve minority groups, and specifically mentioned the work done in California State University’s Cal-Bridge program.
This year’s Discovery Day open house at the Estuary and Ocean Science (EOS) Center shows there’s reason to be hopeful about the health of San Francisco Bay.

In CoSE, science doesn’t stop when the paper is published: Faculty, staff and students engage in outreach efforts and contribute to the surrounding community in a variety of ways.

This year’s annual Discovery Day open house at the Estuary and Ocean Science (EOS) Center attracted over 1,000 visitors, offering community members a chance to learn about the important roles played by marine and estuarine ecosystems. At the event, EOS Center leaders also announced the designation of San Francisco Bay as a “Hope Spot” to inspire conservation efforts. As part of the designation, EOS Center Executive Director Karina Nielsen and other EOS Center leaders will help advance renewed conservation action plans for the Bay.
Another new partnership, with the Oiled Wildlife Care Network, made the EOS Center a triage center for caring for wildlife affected by any future oil spills in San Francisco Bay. A number of faculty, staff and students registered as volunteers through the new partnership, receiving training to prepare for future oil-spill response efforts.

The impact of work in CoSE is felt in California’s schools, too. Led by Assistant Professor of Mathematics Kim Seashore and enabled by a $3.3 million grant from the NSF, an interdisciplinary group of faculty from the Departments of Mathematics, Computer Science and Physics & Astronomy are collaborating with colleagues from the Graduate College of Education to train K-12 teachers for high-need school districts through the National Science Foundation’s Robert Noyce Teacher Scholarship Program.

Professor Emeritus Max Kirkeberg found another way to give back: He was recognized at the 2019 AIDS Walk San Francisco for raising more than $1 million for AIDS charities. Kirkeberg has participated in the event since 1988, and for over two decades has been leading a team at the walk each year in honor of his partner Jimmy, who passed away in 1996. Many staff, faculty and students in the Geography & Environment department walked with Kirkeberg over the years.
BY THE NUMBERS

1st
Woman and Latina appointed dean of CoSE, Carmen Domingo

31%
of CoSE seniors report that they plan to attend graduate school

#7
In undergraduate physics degrees awarded among U.S. master’s granting institutions

$12.5 million
New external grant funding in the 2018-2019 academic year

4
CoSE majors in the top 10 popular majors at SF State

43%
Enrollment of students from underrepresented groups

4 in 10
Faculty and lecturers in CoSE are women

25%
of the SF State student body is enrolled in CoSE
CoSE faculty are regularly featured in local and national news outlets, both for their own work and their expertise on a wide variety of topics. One study, led by Assistant Professor of Biology Rori Rohlfs, was featured in the Atlantic and the San Francisco Chronicle. The team, including a number of undergraduates, analyzed decades-old research papers in the field of theoretical population biology to reveal the historical contributions of women to the discipline.

Work by Assistant Professor of Psychology Melissa Hagan also received nationwide attention, including in the Washington Post and U.S. News and World Report. The study focused on the impacts of the 2016 U.S. presidential election on stress in students.

The writing of faculty members is also finding its way into the popular press. Editorials about marine and estuary science written by EOS Center researchers have been appearing monthly in the San Francisco Examiner. Other notable media coverage includes a feature about the SF BUILD program in the digital magazine Undark and a WIRED article quoting Professor of Psychology Jeff Cookston on his research on fatherhood, which showed that many fathers now prioritize their emotional relationships with their children rather than simply providing for their families.
NEW FACULTY

Henry Boateng
Ph.D., University of Michigan
Assistant Professor of Mathematics
Areas of expertise: scientific computing, computational chemistry, materials science

Erin Bray
Ph.D., University of California, Santa Barbara
Assistant Professor of Earth & Climate Sciences
Areas of expertise: rivers, hydrology, fluvial geomorphology

John Michael Brewer
Ph.D., Yale University
Assistant Professor of Physics & Astronomy
Areas of expertise: planet formation and migration, stellar composition, exoplanet discovery

Jaime Chaves
Ph.D., University of California Los Angeles
Assistant Professor of Biology
Areas of expertise: evolutionary biology, phylogenetics, conservation

Shandy Hauk
Ph.D., University of California, Irvine
Associate Professor of Mathematics
Areas of expertise: humanizing collegiate mathematics education; preparing future college teachers of mathematics, science, and engineering; applying mathematics for social change

Shahrukh Humayoun
Ph.D., Sapienza University of Rome
Assistant Professor of Computer Science
Areas of expertise: visual analytics, human-computer interaction, software engineering

Eric Michael Koehn
Ph.D., University of Iowa
Assistant Professor of Chemistry & Biochemistry
Areas of expertise: organic and bio-organic chemistry, enzymology, drug discovery
Ornella Mattei  
Ph.D., University of Brescia  
Assistant Professor of Mathematics  
Areas of expertise: applied mathematics, mathematical modeling, mathematical aspects of materials science

Charli Sakari  
Ph.D., University of Victoria  
Assistant Professor of Physics & Astronomy  
Areas of expertise: chemical abundances of stars, chemical nucleosynthesis, galaxy formation

Erica L. Sanchez  
Ph.D., University of Washington  
Assistant Professor of Biology  
Areas of expertise: molecular/cellular biology, viral pathogenesis, cancer biology

Isabel Hyo Jung Song  
Ph.D., KAIST  
Assistant Professor of Computer Science  
Areas of expertise: data analytics, entrepreneurship, mobile computing

Jingyi Wang  
Ph.D., University of Houston  
Assistant Professor of Computer Science  
Areas of expertise: big data analysis, cybersecurity, data privacy

Yiyi Wang  
Ph.D., University of Texas at Austin  
Assistant Professor of Civil Engineering  
Areas of expertise: transportation safety, pedestrians, internet of things technology
CoSE has a number of notable alumni who have gone on to distinguish themselves in business, research, technological innovations and more.

Esteban Burchard (B.S., '90), a professor in the USCF Department of Bioengineering and Therapeutic Sciences, was inducted into the SF State Alumni Hall of Fame last year. Burchard’s research focuses on addressing racial inequalities in healthcare, and his lab currently studies the genetics of asthma in African-American children, a group disproportionately affected by the condition. And Corrie Saux Moreau, (B.S. ’00, M.A. ’03), director and curator of the Cornell University Insect Collection, was featured in SF State Magazine. Both Moreau’s research on ant evolution and her work to diversify STEM fields were highlighted in the piece.

Meanwhile, the late Joseph L. White (B.A., ‘54, M.S., ‘58), a pioneering psychology professor, received a President’s Medal at SF State’s 2019 Commencement Ceremony. White, known to many as the “father of black psychology,” spent his career pushing the field of psychology to incorporate the experiences and perspectives of ethnic minorities. He was also instrumental in establishing the University’s Black Studies program during student strikes in 1968.

Other CoSE alums have gone on to lead successful businesses in the Bay Area and around the world, such as Vince Anicetti (B.A. ’77, M.S. ’87), chief operations officer at Coherus BioSciences, whose goal to make the biotech industry more diverse also led him to become the first private donor to SF State’s SEO Scholars program.

Alumni also find ways to reconnect with CoSE and support students in the college. For instance, alums like Jody Vandergriff (M.S., ’08), who co-founded the digital asset management company WebDAM, returned to SF State last year to discuss entrepreneurship with students as part of a workshop series.
SIGNIFICANT GIFTS

Through the generosity of our donors, the University’s first comprehensive campaign is approaching its goal of raising $150 million to support students and faculty, building and improvement of facilities, and energizing unique academic programs — and in the 2018-2019 fiscal year, the College of Science & Engineering received more than $2 million from generous donors. Here’s a roundup of some recent philanthropic support for the college.

Gifts from individuals — like longtime philanthropic support from Kenneth Fong (B.S., ’71) and a recent generous gift from Nancy Blachman — fund cutting-edge research and ensure the success of CoSE’s educational mission. And our deeply committed faculty continue to give back to the University as well. For instance, upon retirement as chair of the Earth & Climate Sciences department, Professor Emeritus David Dempsey gave a gift to the department to establish the Professor Emeritus Dave Dempsey and Rebecca Douglass Scholarship in Earth & Climate Sciences. And a gift from John Monteverdi, a professor in the same department, established the John A. and Anna Monteverdi Fellowship in Atmospheric and Climate Sciences, to honor the memory of his parents.

About 60 miles from Lake Tahoe at SF State’s Sierra Nevada Field Campus, a long and growing list of dedicated volunteers have been raising funds for key renovations to the site through the Friends of the Sierra Nevada Field Campus group. Their efforts have already made beautification efforts at the campus possible.

Our donors play a critical role in promoting success in the college and providing opportunities for students. If you’re interested in learning more or would like to know how to get involved, please contact Michael Behrens, senior director of development for CoSE, at behrens@sfsu.edu or (415) 405-4098.

Assistant Professor of Engineering Xiaorong Zhang and Professor of Computer Science Kazunori Okada pose with a prosthetic arm, part of a project funded through a gift from alumnus Kenneth Fong (B.S., ’71).
To learn more about our college, please visit https://cose.sfsu.edu

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