FOCUS ON:

Diversity, Equity, Inclusion

The social-justice protests that swept the nation in the spring and summer of 2020 sparked a sense of urgency around matters of racial justice, including questions of diversity, equity, and inclusion (DEI) in institutions of all sizes and kinds. Over the past year, thousands of entities, including the University of California, UC Santa Barbara, the College of Engineering (CoE), and its departments have discussed, studied, reflected, and initiated action to address DEI challenges and shortcomings and increase representation. It is an ongoing process that will, perhaps, never be "complete."

"DEI issues are critically important, and diverse perspectives are essential," says CoE dean, **Rod Alferness.** "We're a public university, and we should certainly be representing the population as it exists in California. We have a long way to go to do that."

As suggested by **M. Ofelia Aguirre Paden,** director of the Center for Science and Engineering Partnerships (CSEP), which currently operates fifteen programs having a focus on workforce development and broadening participation in STEM, "Increasing diversity in STEM fields is critical for the economic prosperity of both individuals and the state." With a future shortage of STEM workers looming in industry, she notes, "More diversity in the workforce will not only address the shortage, but also seed innovation and creativity that can lead to new ideas. To do this, however, we must address the inequities in STEM at all levels, starting with including the voices of those who have been historically excluded from the scientific enterprise."

In this special "FOCUS ON: DEI" section, we look at what has emerged as a key challenge of our time, as well as some important existing and new programs, key processes, and people who are working hard to make UCSB a more inclusive and diverse place to work, study, and perform research that, like DEI itself, can move society forward.

Moving the Needle: Expanding efforts to enhance diversity

DEI issues for students in STEM disciplines tend to fall under the heading of either "pipeline" issues (who gets to attend a top engineering program) or "retention" issues (who stays in school and earns an undergraduate or graduate degree here). For students from underrepresented groups, both of these areas come with challenges that more privileged students are less likely to encounter.

Engineering programs across the country, and programs in STEM disciplines more broadly, suffer from a persistent lack of diversity, with women and people of color attending in numbers that are disproportionately small

compared to their numbers in the broader university population and in the population beyond the university.

As this issue went to press, computer science professor **Elizabeth Belding,** Associate Dean for Diversity, Equity and Inclusion in the CoE, was combing through a massive data set containing the aggregated academic records of every undergraduate engineering student from 2010-'20. The data is disaggregated by gender and ethnicity, and the specific metrics include acceptance rates and yield rates (the latter indicating the percentage of accepted applicants who actually enroll), year-one

academic-probation rates, and graduation rates. The goal is to identify the causes that lead to students leaving CoE majors so that the college can take action to address them. She expects to have a strategic action plan for addressing undergraduate DEI issues in place later this year.

"The assessment has been done, and we've pinpointed some problems, so the next step is getting to the bottom of those problems, and saying 'OK, this is happening but why, and what can we do about it so that it's not happening anymore?'" Belding reports.

She began with undergraduate students,

Q&A

with *Belinda Robnett,* UC Santa Barbara's first

Vice Chancellor for Diversity, Equity and Inclusion

Belinda Robnett

Convergence: *You have been at UCSB since last September. What is your sense of where we are as a university, and what are some of your higher-level plans for moving forward in terms of DEI issues?*

BR: There are many impressive and commendable DEI efforts across the UCSB campus. To build on the existing efforts, the DEI Office is working to coordinate these efforts, to encourage collaborations, and to provide resources, educational workshops, and assessment tools.

C: *The College of Engineering has a number of programs that support women and other underrepresented undergraduate students. What additionally do you think the college should do?*

BR: These programs are essential, but engineering as a field, and at UCSB, struggles to increase the numbers of underrepresented minority faculty and students, and has difficulty retaining them. I would like to see greater partnership between UCSB's College of Engineering and school districts serving underrepresented populations. It is crucial to develop relationships with students from middle and high schools to promote interest and support success. Additionally, building upon the existing programs, it is important to lengthen summer immersion programs and to provide structured and ongoing support for pre-majors and for first-year and sophomore students in the major. Retention of pre-majors and majors is crucial. Also, there are fewer programs for underrepresented minority graduate students. I hope to work with the College of Engineering to increase support for these students.

C: *You have met with some engineering faculty and provided some input and suggestions for the diversity plans they have been developing. What are some of the most important things you shared?*

BR: We must establish and consistently implement best practices in the hiring and admissions process. The DEI Office offers workshops to assist units with the formation and implementation of DEI strategic plans. Importantly, we need metrics. While there are a number of DEI programs and goals, at the end of the day, outcomes matter. Our continuing efforts must be data-driven.

C: *Do you have lists of "short-term" and "longer-term" priorities?*

BR: Short-term priorities include building the DEI office, so that we can support campus-wide DEI efforts and launch initiatives. Currently, there is one full-time staff person, so, adding staff is important. We are poised to disseminate a campus-wide 2021 UCSB

because they represent by far the largest proportion of the CoE population. From there, Belding will do the same with the graduate student population and faculty. In parallel with the assessments, she says, "We've already started instituting some changes. It's all happening a bit in parallel: we're strategizing toward addressing some deficiencies even though the plan isn't yet finalized."

Attending university is not a one-size-fits-all experience. People arrive at UCSB from across the country and around the world, from an array of cultures and ethnic groups having equally disparate abilities, religions, gender and sexual identities, and socio-economic status. Their experience and perspectives are uniquely theirs, and for diverse students not only to survive, but thrive, it is essential to identify, understand, and address those *individual* challenges.

During the past year, a great deal of effort has been expended in STEM disciplines across UCSB with the goal of enhancing support for underrepresented students once they are here, so that they feel comfortable, want to stay, and can succeed. DEI advisors and faculty members are looking at ways to build upon successful STEM programs that do this well by providing faculty and peer mentoring and monitoring, and presenting pathways to research experiences and graduate school, supporting community building, providing professional networking, maintaining communication, and educating faculty on how best to offer inclusive pedagogy.

During that time, the college created a formal diversity statement (found on the About page of the CoE website) laying out its commitment to inclusivity and to fair and equal treatment for all people. Further, the mission statement was revised, both to more accurately reflect the scope of the college and to echo the commitment to DEI. And every department in the college was charged with forming a DEI committee and developing a diversity plan to translate good intentions into meaningful actions. They are in progress now.

Perhaps most importantly, last September, after a year-long national

search, **Dr. Belinda Robnett,** a long-time sociology professor at UC Irvine and its Inaugural Associate Dean for Faculty Development and Diversity in the School of Social Sciences, was hired as UCSB's first Vice Chancellor for Diversity, Equity and Inclusion. (See sidebar at left for an interview with her.) Since being hired, she has been putting in place an organizational structure that will, for the first time, bring the university's many well-intended but historically fragmented diversity efforts under the umbrella of one coordinating office.

"Having a new vice chancellor for DEI gives us an opportunity to coordinate our DEI efforts, to collect good data and information, and to create synergy among all these programs," said chemical engineering professor and Academic Senate Chair **Susannah Scott.**

Several months after Robnett arrived, the Office of Diversity, Equity and Inclusion hired a new team of DEI experts, **Rebecca Ritarita Refuerzo** and **Ben Refuerzo,** to provide DEI-related workshops, trainings, and consultations across campus.

Yasamin Mostofi, professor in the Electrical and Computer Engineering Department, sees such activities as keys to enhancing the climate within the CoE. "We need to have more seminars, workshops, and talks for the students to show them the proper code of behavior, to cultivate inclusiveness, and to bring awareness to how the world might look from the perspective of a minority student," she says.

"I feel that right now, maybe something can really happen," says mechanical engineering (ME) professor and vice chair **Jeff Moehlis,** a member of his department's DEI committee. "We have a new vice chancellor. Every department has its own DEI committee and is creating a strategic plan. There will be growing pains, no doubt about it, but we're talking with each other."

"The future is diversity. It should be, and it's about time," says mechanical engineering professor **Irene Beyerlein,** who serves with Moehlis on the department's DEI committee. "It's the right thing to do."

The Student Pipeline: Access opens the door to everything

The pipeline to STEM education and careers gets narrowed when circumstances that people do not control — such as their ethnicity, socio-economic status, ability, or whether they are the first member of their family to attend college — prevent them from gaining access to STEM educations and professions, or even to imagine such a pathway for their lives. Addressing this lack of equal access requires identifying and understanding the many, often subtle, obstacles that can prevent diverse students from having a chance at rewarding and lucrative STEM careers.

"This is a process that requires some introspection, and for our department, I'll frame it around the question, *Who gets to be a chemical engineer, whether as an undergraduate or graduate student, or a faculty member?*" says Chemical Engineering Department chair, **Rachel Segalman.** Few high schools have a class called 'engineering,' and even when it is offered, it tends to focus on engineering that is not chemical, which is something of a niche field. So, it is already a sign of privilege if a high school student knows what chemical engineering is in order to choose it as a major. A lot of our community colleges also lack anything called 'chemical engineering,' so, one of my goals here is for us to work hard on that problem."

Segalman

Top Members of the Society for Advancement of Chicanos/Hispanics and Native Americans in Science (SACNAS) gather; **Bottom** (from right): Josue Morales-Santiago (BS '19) and Anastasia Patterson (PhD '19) at work in Rachel Segalman's lab.

would like to see a class for non-majors that students who are interested in chemistry, math, or related subjects could take early in the curriculum, affording them an opportunity to see what chemical engineering is "in a low-stakes kind of way." She believes that a similar approach, perhaps with an online component, could serve to increase visibility of the discipline at community colleges, and she imagines a related approach to expand the pipeline for graduate students.

"There's no reason that a student who has an undergraduate degree in one of the sciences or a different engineering focus couldn't be a chemical engineering grad student, but that's not normally how we've thought of it," Segalman says.

Marcus Condarcure, a first-generation sophomore in chemical engineering who is an officer in the Society for Advancement of Chicanos/Hispanics and Native Americans in Science (SACNAS), reflects that gap in awareness of the discipline. Chemistry was his favorite science at his public high school, where he took several Advanced Placement courses, but he received only a broad career evaluation, which correlated such elements as skills, personality, and general fields of interest (i.e. STEM, social services, etc.) but "didn't show students what those careers involved," he says. "I arrived at UC Santa Barbara with little, if any, knowledge about chemical engineering. I kind of lacked the foundation."

This year, the department began holding a series of faculty Zoom meetings with students at UC Riverside, Cal Poly Pomona, and Cal State Long Beach. The goal was to broaden outreach to institutions that have significant populations of students from underrepresented groups (URGs) and encourage top students in STEM disciplines to consider whether they might be interested in a graduate program in chemical engineering. "The idea is to target students who have never thought about a chemical engineering degree and to get them thinking about it early," says chemical engineering professor and

Campus Climate Survey. The survey results and the input from the soon-to-be-formed DEI Office Status Advisory Boards will inform the UCSB Campus Diversity Strategic Plan, which will be released in the fall. The DEI Office is also adding additional Diversity Officers. Currently, we have 42 DEI Graduate Student Officers. We anticipate adding undergraduate student, staff, and faculty DEI Officers to support unit efforts in implementing DEI plans and to support the important Associate Dean/Faculty Equity Advisors [FEA] work that is underway. Teamwork is the cornerstone of my approach.

Long term, we expect to see an increase in the representation of underrepresented minority faculty, postdocs, staff, graduate and undergraduate students. Our efforts must also focus on the campus climate. The DEI Office seeks to work with units to enhance feelings of belonging for all members of their communities. Retention of underrepresented groups is a concern, and creating a hospitable campus climate supports our goal to attract, increase, and retain members of these communities.

C: *Has your office, working in collaboration with other UCSB administrative units, established any specific goals regarding DEI that you would care to describe?*

BR: The DEI Office is launching a Thriving in the Academy through Reform, Together Initiative. In collaboration with the Graduate Division, the DEI office is initiating a campus-wide Thriving in the Academy Program for Graduate Students, with a focus on underrepresented minority students. Similarly, a Thriving in the Academy Program for faculty will also commence this fall. Our DEI Office will similarly collaborate with other offices to jump-start Thriving programs for undergraduate students and staff. The goals of these programs are to create sources of support, to impart institutional knowledge, and to establish a sense of community.

C: *In the wake of last year's nationwide racial-justice protests, the university and its major divisions and departments have taken steps, conducted (ongoing) reviews, established initiatives, and the like. Is what's happening enough, and if not, what is needed? Also, how does your office ensure that strategic plans lead to meaningful action?*

BR: How we proceed, together, will determine the success of our plans. Knowledge is power. For decades, scholars have conducted research on institutional change. The literature can inform our efforts, and the DEI office wants to arm the campus with this knowledge. Relying on research results and proven techniques can help us to move the needle. Diversity work is not easy because it calls upon us to question taken-for-granted assumptions and to establish new approaches. Engineering has a quite diverse population, thanks to many international students, especially from India and China, but there are very few Black and Native American students, and despite the university being recognized as a Hispanic Serving Institution, we have few Latinx students relative to the general UCSB population.

C: What message do you want to give to current and prospective engineering students, faculty, and staff when it comes to DEI?

BR: I appreciate all of your hard work and commitment to diversity, equity, inclusion, and social justice efforts. There has been overwhelming support for the DEI Office. Thank you! I also offer a message to all research-intensive universities: We must do better. We must hold ourselves accountable.

department vice chair, **M. Scott Shell.**

Chemical engineering is one of four departments on campus that participate in an NSF project called the California Consortium for Inclusive Doctoral Education, which offers workshops and trainings, Shell says, "to help us think about how we can revamp our admission practices to make them more inclusive."

One thing the department did as a result was to drop the GRE requirement, which, Shell notes, "has been shown to be biased against underrepresented groups and to have little value in predicting success for our graduate students. It's a test you can study for, but research requires a very different skillset geared toward solving open-ended problems."

> "It falls under the heightened mindfulness of DEI issues.... There is an awareness that we need to be proactive, and a willingness to do what we can."

Mechanical Engineering (ME) professor **Irene Beyerlein** reports that her department's DEI committee, on which she serves, has developed a rubric for graduate admissions "with the intention to mitigate the implicit bias one might have when reading an application. Our thinking is that, despite our best intentions, we may have an unconscious bias against a female candidate or a candidate from another URG, and we want to address that. To me, it falls under the heightened mindfulness we all have of DEI issues now. There is an awareness that we need to be proactive, and a willingness to do what we can."

Chemical engineering has also created an admissions rubric that, Shell says, "is less accomplishment-focused and more skill-focused" and resulted in roughly double the number of students from URGs being admit-

ted relative to the previous year.

Black Studies professor **Sharon Tettegah,** who has an appointment in computer science and directs the Black Studies Research Center, leads several projects designed to increase diversity in STEM. In one, called Students Engagement and Enrichment in Data Science (SEEDS), she and her UCSB faculty and staff colleagues will mentor twenty to thirty students from URGs, who will arrive in fall 2021 and reside in student housing, which Tettegah envisions as a "living and learning community," while learning data science in what she describes as an "informal space," because the students will be exposed to data science without taking a formal course.

She has an agreement with the library to offer the students introductions to the R and Python programming languages. Students, who will be paid an honorarium to participate, will be placed in internships — some at the UCSB library and others at Institutional Research — to develop skills and start applying what they're learning.

"The goal is to develop skills in data science and computing in people who are interested in various fields and have a perspective that aligns with helping their community, so that when they go out into the workforce, they have skills," Tettegah says. "It's about providing professional development applicable to many disciplines."

"Community is explicitly part of the program," Tettegah notes. "It's about bringing in diverse epistemologies so that people don't have to conform to a particular way of being or a certain way of expression or learning. That's why we're doing it in an informal way, why we're building a cohort, and why we will have the Black Hall and La Familia to house students. They'll feel safe and comfortable and have unlimited learning days of data science and diverse fields at the convergence of STEM, social sciences, and the humanities."

Because data science applies to so many fields, there might be a SEEDS program in almost any discipline. One new SEEDS program is Black Researchers Advancing Intelligence in Neurocomputation (BRAIN), which Tettegah formed in partnership with UCSB professor of neuroscience **Kenneth Kosik** and a diverse group of PhD student and professional researchers from several institutions.

For roughly the past decade, materials faculty have collaborated with faculty at two Minority Serving Institutions: Jackson State University in Mississippi and the University of Texas, El Paso, in the NSF-funded Partnerships for Research and Education in Materials (PREM). The partnership-and-exchange program is aimed at fostering next-generation materials research by having a team of faculty work with engineering and science students from diverse backgrounds who will, hopefully, go on to earn advanced degrees.

Now in the third round of funding with JSU and the second round with UTEP, PREM is currently being overseen by materials and chemistry professor and Materials Research Lab (MRL) director, **Ram Seshadri,** chemistry professor **Javier Read de Alaniz,** MRL education director, **Dotti Pak,** and other faculty.

"This partnership has played a critical role in our sustained effort to increase diversity in STEM at UCSB, as well as at the national level," says Read de Alaniz. " Such programs play an important role in expanding the pipeline that can lead to increasing minority representation in STEM faculty positions."

In addition to the promise that a more diverse engineering field will yield solutions that are more broadly considered and more comprehensive, inclusion and diversity are also becoming increasingly important criteria for funding agencies, Seshadri says, "Diversity is simply the right thing to do. There are huge populations that we must not ignore."
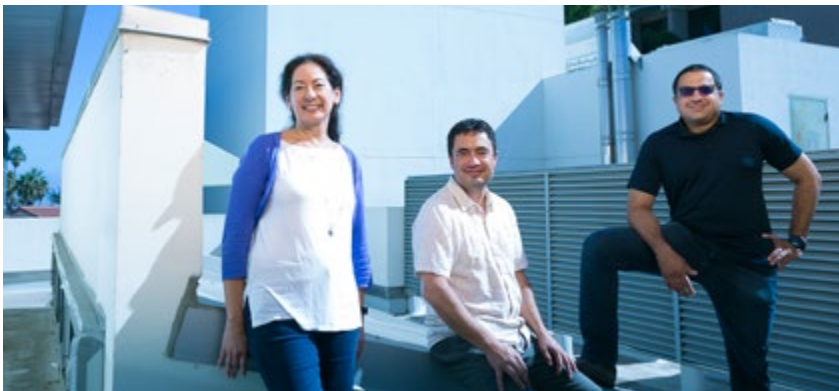
Computer Science Department chair,

M. Scott Shell

Sharon Tettegah

Arica Lubin

Top *(front row, from left): Bridge to the Doctorate cohort members Emmanuel Kayede, Guillermo Najarro, Roman Aguilera, Xochitl Clare, Marcela Areyano, Lourdes Velazquez; (back row from left): Roberto Abril Valenzuela, Tobias Mazal, Nicholas Pfau, Alec Vallota-Eastman, Marcos Reyes, and Eliovardo Gonzalez-Correa.*

Bottom *(from left): Dotti Pak, Javier Read de Alaniz, and Ram Seshadri collaborate with two historically Black colleges to increase diversity in STEM faculty.*

Tevfik Bultan would like to see greater diversity in the CS field not only in terms of underrepresented groups, but in terms of fresh perspectives they and others might bring. "We need a range of people with broad interests, because CS has a big impact on every aspect of life," he says. "You can pick any important topic in the news, from the spread of misinformation in social media to how we have survived the pandemic by working remotely; CS has an important role to play in solving almost all of the problems our society is facing. I think that is not understood by many high school students. If you want to have an impact in any area, computing is a great area to be in, and there is no single type of person who should be working in this field."

Read de Alaniz also leads the NSF-funded Bridges to the Doctorate (BD), a pipeline program that includes strong retention components. The program enables him and Dr. **Arica Lubin,** associate director of the Center for Science and Engineering Partnerships (CSEP), to recruit a cohort of twelve minority graduate students from STEM departments around

campus. The current group represents eleven different departments. Each student receives two years of funding from NSF, with additional funding from **Executive Vice Chancellor David Marshall** and campus deans.

"The goal is to support them for five years," Read de Alaniz says. "We track their progress. We meet monthly with them and work toward creating a family away from home. Our goal is for all twelve of the fellows who come into the cohort to leave with a PhD."

Among the current cohort is **Emmanuel Kayede,** a third-year PhD student in the BD program who moved from Ghana to the U.S. during middle school. He conducts his research in the lab of ECE professor **Umesh Mishra.**

"I was lucky to get into the BD program," Kayede says. "Funding was going to be an issue for me, and without Umesh's grant and the BD fellowship, I would have had to TA a lot, which takes a lot of time from your research. The BD program eases all of that stress."

"The mutual support that students provide for each other within that family or community model helps retain them and expands the pipeline," says Lubin. "Since representation is still limited in each of these departments, it is important for students who are underrepresented to have a supportive peer network. This model can encourage prospective students to see that they can engage with both the community in their department as well as across other STEM departments. This will eventually help expand the pipeline."

"As a first-generation student," Kayede says, "Community is vital to me. Through the BD program, I got to meet all these fellow grad students in other departments. It makes

you realize that you're all in this together, in this new frontier that your parents really have no idea about."

The BD program, hosted at CSEP, has been a big success, with eighty-five percent of students in the first cohort of thirteen completing their PhD and and one hundred percent of the current twelve students on track to complete a PhD, says CSEP director, **M. Ofelia Aguirre Paden**.

Read de Alaniz sees an opportunity to expand the pipeline into graduate school by including people like Pak and Lubin on graduate admissions committees, because they can advocate for graduate students from URGs.

"I think graduate programs would benefit from listening to the people who are running these undergraduate research programs and bringing underrepresented minorities to campus," he says. "Many of them have advanced degrees themselves, so they know what it takes. It would allow for a more holistic approach to making such decisions. "

Another hurdle in terms of inclusive graduate student admission is that many dedicated faculty mentors in pipeline programs are located at undergraduate institutions that don't have the same resources as UCSB has, Lubin explains. "When their students apply to R1 institutions, like UCSB, our faculty are unfamiliar with the faculty directors who are mentoring these students. As a result, there is a level of knowledge about the students that is not being leveraged at all."

Lubin would like to see faculty at R1 institutions interact more with faculty at institutions that enroll large numbers of underrepresented students. "Often, faculty who are from underrepresented groups themselves serve as role models for UCSB students who might like to follow a similar career path. There are many mutually beneficial ways that our campus could work with faculty from those institutions."

Pipeline issues can have multiple components. For instance, in terms of choosing graduate students to admit, it's easy to select those who went to elite schools, because experience indicates that they will be ready when they arrive. "But not everyone, such as first-generation college students, had a path or even a genuine possibility to go to one of those schools," Lubin says. "We have seen through the BD program, and in working with grad students in general, that incredible students come from all kinds of universities. You have to be selecting from a variety of institutions. There are many ways of doing that."

Do I Belong Here? Impostor syndrome is the invisible challenge for many non-traditional students. With the right support, they overcome it.

The question in the headline above plagues many students from underrepresented groups. The simple goal is to make them believe the truth: *Yes, I do.*

"It's hard to feel like you belong when there are few people in the room that look like you. Yet, that's the everyday experience of students who are traditionally underrepresented in Computer Science and Engineering," says **Diba Mirza,** an associate teaching professor in the Computer Science Department who leads the Early Research Scholars Program (ERSP), which is aimed at helping to put underrepresented students on the path to high-paying jobs or graduate school. "A first step to addressing those feelings is to make students feel welcomed in this environment."

The university setting and experience can induce a kind of culture shock in students from URGs who have had to overcome tremendous odds to get into college but have made it, perhaps with little support. Finding themselves suddenly in a university setting, where everything is new and foreign and their classmates may seem to have it all under control, can make them wonder, *Do I belong here? Can I make it here?*

The phenomenon, known as *impostor syndrome*, is widely recognized and is experienced by even highly accomplished people. **Arica Lubin,** associate director of the Center for Science and Engineering Partnerships (CSEP) at UCSB, refers to it as "impostor fear," explaining, "It's that universal fear everyone experiences, because on some level, everyone feels they don't measure up. It's the fear of someone finding out you're not as good as your CV makes you look."

Impostor syndrome can be especially debilitating for students from URGs and first-generation students, particularly in their first year, before they have settled into their new surroundings, routine, and workload. It can be just as hard for transfer students, who are more likely to be from URGs, which is why programs such as ESRP are so valuable.

Course work at UCSB is harder than at community colleges, and transfer students enter the engineering program just when the workload is ramping up with a full slate of demanding upper-division courses, all while adjusting to the accelerated timeline of the quarter system. And while their classmates have friends and study groups from two years in the program, transfers arrive knowing no one and having to orient themselves quickly.

Without support, these students can find themselves feeling alone and overwhelmed. Their grades may slip. They may face financial problems and fall behind in their course work. And if they have to work to earn money, it is easy for them to wind up in freefall.

Future vision: undergraduates (from left) Cynthia Zhang and April Sanchez demonstrate their project to fellow undergraduates Maggie Lim and Dawit Aboye at the Computer Science Department's Spring Research Showcase.

"Impostor syndrome is very real," says Mirza. "I talk about it in my intro classes, because it helps students recognize a strange and troubling feeling. I speak about the growth mindset and thinking about whether you have innate skills or can develop them. It's an important issue that we need to address head-on and early."

Nor is impostor syndrome limited to undergraduates, says Lubin, who addresses the topic with the graduate students in the programs she leads.

Emmanuel Kayede is a first-generation student and a third-year PhD student who moved from Ghana to the United States in his last year of middle school. His research in the lab of electrical and computer engineering professor **Umesh Mishra** involves seeking ways to improve wet etching of gallium nitride in order to make devices. Kayede earned his bachelor's at UC Santa Cruz but was intimidated at first by the coursework he faced in the UCSB graduate program, and also felt a bit out of place.

"Since high school, I've been in a situation where there weren't many Black students around," he says, "Maybe that makes me want to prove myself more, to show that I do belong here, but at the beginning I was always second-guessing myself and wondering if I was ready. I'm not one hundred percent cured of my impostor syndrome, but I trust myself more now."

"I think it's helpful for students early on to be forced to talk about it, to know that that their peers are feeling the same way, the peers who they compare themselves to," says Lubin. "It's important for them to appreciate that a peer who they think is doing everything perfectly and is really a superstar actually has the same fears that that they feel. Then, we can face it and discuss it. It's also important for them to hear from faculty that they, too, felt it when they were graduates and can still feel it now. It's important to say to them, 'Look, you're not alone. This is common; this is part of being human.'"

Female students have their own set of challenges, more so if they are from a URG, says Mirza: "There are all these challenges women face early on because of the stereotypes we have in society that tell them they don't belong in STEM fields, and then they come along and see so few women in their classes, and some of them say, 'Maybe I don't belong here; what am I doing here?' It puts enormous pressure on them to prove themselves, not knowing if they will measure up. It's impostor syndrome, it's real, and we see it all the time."

"I didn't even understand what imposter syndrome was," says **April Sanchez,** a first-generation college student who participated in ERSP and will graduate in June with a BS and MS in computer science. "All I knew was that it was some unnamed feeling that I struggled with being a woman in computer science."

"Without proper support and mentoring, it is easy for students who experience setbacks to give up, particularly those who feel like they don't belong in the mainstream community of computer science," Mirza notes. "That effect perpetuates existing inequities in our discipline. My main goal is to reverse this effect by mentoring students, building a sense of community, and normalizing the challenges students face in their academic careers."

M. Ofelia Aguirre Paden, director of CSEP, which hosts fifteen programs, all of which, she says, "include integrated diversity components," echoes Mirza's view.

"Students from URGs may have limited access to critical resources," she says. "During high school, they may not have access to a home computer. If they have a computer, they may not have a reliable internet connection or any connection at all. They may have to work to contribute toward family housing and food expenses or care for their siblings, both of which limit the

time they can dedicate to their studies or to taking advantage of enriching academic opportunities. None of this has anything to do with their ability, but it can prevent them from reaching their potential."

Well-funded high schools may offer Advanced Placement (AP) courses in computer science, taught by knowledgeable teachers and supplemented by the latest technology. Such courses — a big plus on college applications — are not offered at under-resourced schools, which are often found in areas that have a lower tax base and enroll high numbers of low-income students and others who are the first in their family to attend college.

The pipeline for those students to enter the field is often very narrow or even invisible. Scalable programs like those offered through CSEP do an excellent job of expanding the pathways available for students to achieve success and find their way to successful and rewarding STEM careers.

Three years into his PhD program in electrical and computer engineering, first-generation student Emmanuel Kayede says, "I trust myself more now."

Retaining Talent: Diverse students require diverse forms of support to ensure that they succeed and graduate

Attracting faculty, staff, and students from diverse groups into the UCSB College of Engineering and other disciplines in the broad area of science, technology, engineering and mathematics (STEM) is a big part of the DEI equation. But just as important is retention — ensuring that anyone who comes to the campus wants to stay because they feel at home here: welcome, comfortable, and supported.

Rod Alferness, dean of the College of Engineering, addresses the circular nature of the pipeline-retention dynamic when he says, "Students from underrepresented groups are looking for a place where they see people like themselves, but once we successfully recruit those students, we have to be able to retain them. Our efforts to build up that popu-

lation will only be as good as our retention effectiveness."

Inclusive pedagogy is an especially important component of retention. It refers to an array of best practices intended to address the fact that how instructors teach — the language and techniques they use, the tone of their presentations, the degree to which those fit students from different backgrounds — can be as important as *what* they teach. Such practices are based in "having a broader perspective that goes beyond your own experience; it's having an appreciation for the personal experience your students bring to the classroom and overcoming basic hidden assumptions that we don't think of," says computer science professor and CoE Associate

Dean for DEI **Elizabeth Belding.**

Recently, she attended a seminar called "The Syllabus as Equity Practice," on how to make a syllabus equitable. She learned a great deal, she says, about things "I had not thought about previously. For example, a student who comes from an under-resourced high school or is a first-generation college student might not know that you actually mean it when you write in the syllabus, 'If you are having a problem, come see me.' They might view a professor as an authority figure who is intimidating or who should not be bothered. To be inclusive, you have to be really explicit. The syllabus should list specific resources that students can use if they are struggling. Evidence-based research shows that

explicit statements in the syllabus are more effective than just *saying* it on the first day of class."

Inclusive pedagogy is at the heart of a collaboration linking Black Studies professor **Sharon Tettegah,** who has an appointment in Computer Science and is the director of the Center for Black Studies Research, and computer science professor **Timothy Sherwood**. They received a one-year, $60,000 grant from Google aimed at bringing the power of computational science to underserved Black and Latinx student populations. Their proposal was one of sixteen chosen from more than one hundred that were submitted for the grants from universities around the world.

Tettegah and Sherwood proposed

student-driven foundation for understanding issues of personal significance through a diverse lens.

Elsewhere, Tettegah is focused on STEM content, which, she says, is "one relatively little-studied area of research. We have been examining structure and some elements of pedagogy, but we've never looked at the content itself."

One of her NSF-funded projects involves studying ways that people learn best and the material that interests them. She begins with the question: "Could it be that some groups who are underrepresented in STEM are turned off by the curricula?"

She is working to develop a set of curriculum guidelines and models that may increase the alignment between

Mirza says that a key element in retaining students is building structures to identify those who are struggling, *before* they drop out. "We don't get to hear much from the students who don't succeed," she explains. "They just fall through the cracks and disappear. We have to pay attention to that. One concrete way of doing so is by getting early feedback from students and providing them with regular formative feedback."

Diba Mirza

Their "flipped research" model is intended "to put student scholars in the position of identifying and refining topics in computing research that connect directly to their lived experiences, and then proposing those ideas as topics of research by the broader community."

---

a "flipped research" model intended "to put student scholars in the position of identifying and refining topics in computing research that connect directly to their lived experiences, and then proposing those ideas as topics of research by the broader community."

The novel approach empowers students of color, as the drivers of research, to impact the research process by identifying topics that matter to them. Student teams will work through an iterative design process with faculty and graduate student mentors to refine their broader research questions into a form similar to a traditional call for proposals (CFP). Those CFPs can then be shared publicly or presented in person to interested program managers and industry leaders to inform their future research investment."

This innovation in interdisciplinary research would create a new

engineering curricula and students' expectations and preferences for learning. These results, she says, have the potential to broaden participation of women and students of color.

Computer science associate teaching professor **Diba Mirza** received a five-year, $400,000 grant from NSF to launch the Early Research Scholars Program (ERSP) at UCSB, which she has been leading since 2018. "The goal of ERSP is to help undergraduates develop their identity as computer scientists and researchers early in their careers. ERSP students learn the skills they need to succeed in research by engaging in a year-long team-based research experience that comes with structure and support from multiple mentors. "If we want to retain students at the graduate level, we need to prepare them better at the undergraduate level," she says.

Striving to ensure that students succeed in the short term enables them to envision a promising future, which keeps them in the game. Chemistry professor **Javier Read de Alaniz** and Dr. **Arica Lubin** (CSEP) run the NSF Bridges to the Doctorate program, which supports and mentors twelve STEM graduate students, referred to as *fellows* in the program, from departments across campus to earn their PhD. Meetings with fellows occur every two weeks, fellows meet separately among themselves, and Read de Alaniz and Lubin make sure that students have access to the right kinds of resources and mentoring for five years, or until they complete their degree.

"That consistent mentoring, networking, and resource scaffolding that is provided over the entire course of their PhD — not just one or two years — is, I think what really helps to retain our graduate

students," Lubin says.

Mirza has had a similar realization running ERSP. "One thing this program has taught me is that regular mentoring makes a big difference, because it helps us to develop a shared understanding of the challenges students face and to come up with ways to address those challenges in a proactive way," she explains, adding "Peer-mentoring is another powerful tool, because students find near-peers more relatable. The Computer Science Department now has undergraduate students come into courses to help out as tutors, who are referred to as "learning assistants," so that students who might be challenged have role models and are able to engage more deeply with course materials.

"That kind of messaging to a student is so important," Mirza notes. "It's saying, 'I expect you to find this difficult at first, but here are some concrete ways you can master the material.'"

First-generation students and other students from underserved high school districts often need extra time to acclimatize to the university to fully appreciate that there are resources, and that they are not only entitled to use them, but expected to.

CSEP undergraduate research programs coordinator, **Dr. Samantha Davis,** says that she is sometimes taken aback by what students say while she is recruiting for training programs. "I'm going to classes and saying, 'We want you to be in these training programs, *especially* if you have no experience.'"

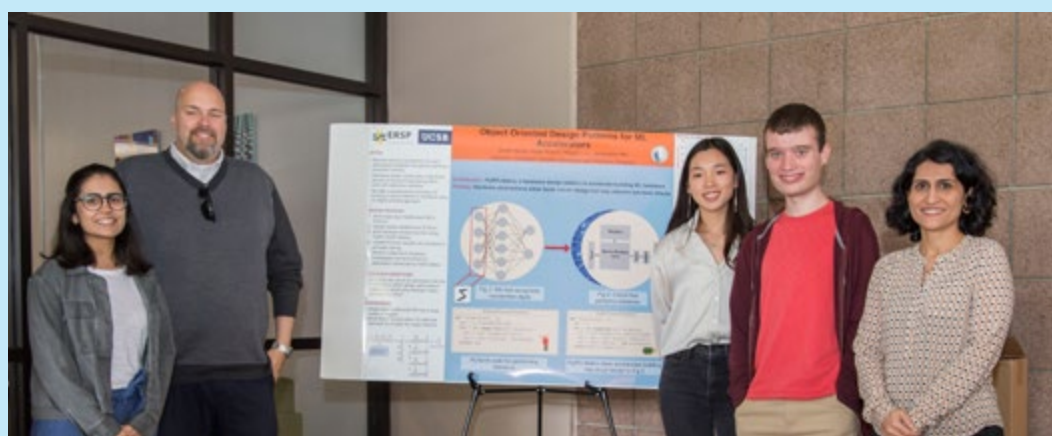But students who come from underfunded high schools or are, for other

Top: At a science communication workshop, Samantha Davis (far left) interacts with UCSB students Celeste Parra Bravo (center) and Roy Garcia, both alumni of the Maximizing Access to Research Careers program who are now in graduate school.

Bottom: Students and mentors in the Early Research Scholars Program (ERSP) gather at the Computer Science Department's Annual Research Showcase (from left): PhD student Deeksha Dangwal, Professor Tim Sherwood, undergraduates Maggie Lim and Dylan Kupsh, and ERSP director, Diba Mirza.

Samantha Davis

reasons, unaccustomed to receiving support, don't necessarily believe her. "I can't tell you how often a freshman student will say to me, 'I'm really worried that I don't have any experience yet; I don't have much on my CV,'" Davis says. "Trying to communicate this to students has been eye-opening. A lot of them are taking themselves out of the running based on the exact things that would make me want to choose them."

Davis, who has a PhD in ocean ecology and lectures in the Department of Ecology, Evolution and Marine Biology, says she has found "that you can't assume anything." As a TA in grad school,

she thought that students who didn't come to office hours didn't care. Since then, she says, "I've found that's just not true. There are many more things going on than I knew that might preclude someone from coming to office hours. So, changing our mindset, addressing blind spots, and trying to address our biases is so important."

For all of the pipeline issues, says Belding, "There is much that we can do to ensure that we have a welcoming and inclusive campus climate. For instance, we need to make sure that a Black student who arrives in engineering is socially and emotionally supported and

well connected with the Black-student organizations on campus, so that he or she can be part of a community," she says. "Building community is critical, because when you feel like you're going it alone, all the problems and challenges feel much bigger. We need to provide the right support structure for students based on their individual life experiences."

Chemistry and chemical engineering professor **Susannah Scott,** who is also chair of the UCSB Academic Senate, works closely with underrepresented students, and especially first-generation students, in the NSF-funded Enhancing Success in Transfer Education for Engineering Majors (ESTEEM) program. Started in 2011, it shares elements that make it successful with other programs on campus.

"Our original goal was to target first-generation students," Scott recalls. "That is particularly important in engineering, because students in the K-12 system generally don't encounter engineering unless they have a family member who is an engineer. So, there is a pretty strong correlation between coming from an engineering family and studying engineering. That's one reason it has taken so long to increase diversity in engineering as a whole."

ESTEEM, which is funded by the NSF's Division of Undergraduate Education through its Scholarships in Science, Technology, Engineering and Mathematics (S-STEM) program, serves academically talented students who have high financial need and who often have no expected family contribution to their college expenses.

"The university normally gives students like these a number of grants, which cover a certain portion of their college expenses, but they are expected to do work study or take out loans to cover the rest of their costs," Scott says. "We're talking about students who are wary of borrowing large sums of money and find it particularly hard to do a significant amount of work study at the same time they are trying to keep up with a very demanding curriculum and succeed in engineering."

ESTEEM provides up to ten thousand dollars of financial support per student per year.

"We then add all kinds of academic support and networking and cohorts," Scott says.

The program was renewed by NSF in 2016, and expanded to target transfer students from some of UCSB's feeder community colleges. "A lot of transfer students are intimidated by the big difference in cost between a community college and university," Scott says. "We've had some tremendous successes helping them be more comfortable making that transition."

Another retention challenge for first-gen-

Students gather with recruiters from engineering firms at the ESTEEM Scholarships Breakfast with Industry event.

eration students is that they tend to feel strongly connected to their families, who are very supportive but, typically, not highly knowledgeable about the university experience. "We hear about students who are having a tough time, who maybe didn't get to study enough because they had to work and didn't do very well on a midterm. Their family will say, 'We understand, and we love you, and if you want to come home, you can.' That's great moral support, but is not necessarily the right message for a student [in terms of retention], because it may lead him or her to make decisions that are not in their long-term best interests."

The UC Office of the President has statistics showing that, just six years after graduation, the median income of first-generation students surpasses that of their families. "The value to their families of the students' finishing and graduating is huge," Scott says. "At the same time, those students are under tremendous pressure to support their families. It is really important, therefore, that we keep them, support them, and make sure they finish strong. We don't want to see this achievement gap between the students who have to work a

lot outside of school and those who have the luxury of not having to work. We want all of our students to achieve as much as they can while they are here."

Transfer students have another unique set of challenges, based on where they are in their educational journey when they arrive at UCSB. "They come during junior year, precisely when the engineering curriculum ramps up with up to five hardcore engineering courses. They also have to adjust to our fast-paced quarter system, so everything is accelerated," Scott

"Programs like ESTEEM... provide not just funding, but an environment where students can flourish and achieve their personal goals.... Together, we form a community in which we all care for each other professionally and personally, and that makes a real difference."

says. "All the students in their cohort have already formed study groups, they know how to do things, they know who to ask. Transfer students have to figure it all out on the fly. It's a culture shock."

To support the students, Scott and her colleagues provide tutors to fill in any academic gaps they may encounter. The students also have a key to a quiet room in a trailer next to her office, where they can study anytime or work together on projects. The program also offers occasional events and, during normal times, twice-yearly breakfasts with industry leaders affiliated with UCSB.

"Students love it," Scott says. "They get to talk with people who are working in industry right now, and who are willing to share their own stories. We've had students get internships and jobs this way. It provides professional networking that they otherwise don't have access to, because no one in their family is in engineering."

"ESTEEM was one of the best resources that I had at UCSB," recalls **James Cruz** (ME '20), who transferred to UCSB from Moorpark College and now works as a mechanical engineer for the Naval Surface Warfare Center

(NAVSEA). The support and the stipend he received, he says, "relieve some of the financial stress college can bring. As an engineering student, a supportive cohort is the key to success. ESTEEM provides just that."

Students, and especially those who come from less privileged backgrounds or have less experience with universities, thrive on personal attention. Sometimes, says Scott, "All it takes for a struggling student, especially one who might not feel like he or she belongs, is to hear someone say, 'You do belong here. If

For UCSB alumnus James Cruz (ME '20) the supportive cohort he encountered in the ESTEEM program proved "the key to success."

you were good enough to get in here, and it's hard to get in here, then you belong.'

"Just sending a short e-mail to a student who didn't do well on a test can make a big difference, to let them know that you see them, you're paying attention, you care about them, and their success matters to you," Scott adds. "I think we owe that to all of our students. We will miss a lot of good engineers if we label them as not belonging or not cut out for university education or for this major, because they didn't do well on a particular midterm. We can lose them simply because they don't believe in themselves."

Programs like ESTEEM and BD provide the students in them not just funding but also, says Lubin, "an environment where students can flourish and achieve their personal goals. You're building this community where they are

Members of Los Ingenieros, a student organization dedicated to empowering Hispanic students in STEM.

supported by peer, faculty, and staff mentors; where they engage with professional networks and resources that open doors; and where they exchange strategies for successfully navigating their degree programs. Together, we form a community in which we all care for each other professionally and personally, and that makes a real difference."

Those graduate students who become so good at supporting each other can also be valuable contributors to the ongoing DEI discussion. Mechanical engineering (ME) professor and vice chair, **Jeff Moehlis,** who is on the department's diversity committee, says that graduate students are contributing to the department's DEI strategy and climate survey. "We have three graduate students on our committee, and we are very much listening to them," he says.

"Graduate students have good ideas. They know what's going on, and we can learn a lot from them," says ME professor **Irene Beyerlein,** who is also on the committee. "They've helped us to identify a few problems we weren't aware of until we heard from them in our committee discussions."

CSEP's Davis, who works with students from URGs in various programs designed to ensure that they thrive and graduate or pursue advanced degrees, was a key contact for Black STEM students last spring and summer in the wake of George Floyd's death and the ensuing nationwide racial-justice protests. She says she saw a lot of positive things from the university and from students during that time.

"Everyone had their own process to deal with what was happening," she recalls. "A lot of the grad students are friends and peers. I was really impressed by how they worked with each other to initiate dialog with departments, and how campus administration and departments reached out to students to try to

understand the short- and long-term actions we can take, and to come up with lists of what we want to do."

Several staff members who work with graduate students from URGs — such as those in the Black Graduate Student Association; Graduate Students for Diversity in Science; the Queer and Trans Graduate Student Union; Women in Science and Engineering; and Mathematics, Engineering, Science Achievement — note the importance of recognizing that every hour those students spend working for causes that they care about is an hour not spent on research. And that, Davis says, "puts them at a disadvantage from their peers who are not doing such free work."

That is why she supports a balanced approach to addressing DEI issues, combining professional DEI training with "a decentralized approach, where different departments can focus on different things depending on what has been identified as necessary. I like, too, that there are grassroots conversations, that we hear from the people who are in these situations, so we can make sure the training is effective and covers the things that people want to discuss."

"We need to be more proactive about building cultures of inclusivity, where every student is supported regardless of their gender, ethnic identity, or any other condition," Belding says. "That requires maintaining awareness of the topic, attending workshops and training, having discussions about the importance of inclusivity, watching our climate, and doing regular climate surveys. I'm so glad that the vice chancellor's office will do a campus climate survey this year and every two years after that. That way, when challenges are found, when we see that something needs attention, we can do something about it by taking appropriate and meaningful action."

The Faculty Pipeline: Challenges and approaches to overcoming barriers that limit representation

➤

Chemical Engineering Department vice chair, M. Scott Shell, interacts with participants during a virtual workshop hosted by the department for undergraduates across the U.S. to learn about the PhD experience, the value of the degree, and how to apply and get into graduate school.

⋀

Double bind: Postdoctoral researcher Aide Macias-Muñoz normally publishes two to three journal papers per year. With day care for her daughter closed during COVID and her husband working as an ER doctor, she was unable to publish any in 2020. One prospective employer told her that to be a stronger candidate for a faculty position, she would have to publish more.

Students are inspired by the people who present lectures to full classrooms and lead laboratories that conduct groundbreaking research. They are especially inspired if they can see themselves in those instructors. On the other hand, students who do not see themselves in those holding leadership positions can have a harder time envisioning their own success. Further, diverse faculty leading diverse labs and teaching to diverse groups of students enhance the engineering professions, and all STEM professions, by bringing a wider range of perspectives to problem-solving processes and the solutions that result.

As the College of Engineering and UCSB work to expand student diversity, parallel efforts are under way aimed at generating faculty applications and hires in the college and in STEM disciplines across campus that reflect the diversity of the university at large and California as a whole.

"We all need representation, someone who looks like us," observes **Ram Seshadri,** director of the NSF-funded Materials Research Science and Engineering Center (MRSEC) at UCSB, also known as the Materials Research Lab (MRL).

Black Studies professor **Sharon Tettegah** is director of the Black Studies Research Center and has a long track record of working to diversify STEM fields. In one current project, she and **Belinda Robnett,** UCSB's Executive Vice Chancellor for Diversity, Equity and Inclusion, will co-lead Aspire: The National Alliance for Inclusive & Diverse STEM Faculty, a three-year effort linking UCSB with eighteen other universities across the nation to develop inclusive faculty recruitment, hiring, and retention practices. The program, led by the Association of Public and Land-grant Universities (APLU) and funded in part by the National Science Foundation, is intended to ensure implementation of inclusive teaching practices in STEM disciplines and increased diversity in the STEM faculty at the participating institutions.

"UCSB is committed to anti-racism and to creating a community of students, faculty, and staff that embraces the rich cultural, racial, geographic, economic, and social diversity of the state of California," Tettegah says. "We are excited and honored to join these eighteen institutions that are taking on the important work of addressing these issues."

Cluster hires, in which a number of faculty are hired together, either in a single discipline or in complementary disciplines, are one way to accelerate progress in achieving greater faculty diversity. A letter distributed across campus in April and signed by **Chancellor Henry T. Yang,** Robnett, and other top

UCSB administrators and faculty, announced that the next Mellichamp research cluster, funded by longtime UCSB benefactors **Duncan** and **Suzanne Mellichamp** (see article on page 40) will focus on scholarly areas of social justice and equity issues.

"The intention is certainly that the people who are hired for the cluster will enhance campus diversity," says **Rod Alferness,** dean of the College of Engineering.

Female STEM faculty continue to encounter obstacles ranging from overt instances of disrespect in the classroom to finding themselves assuming the role of caretakers for troubled students to a greater extent than might be true for their male peers.

An April 15 article in the *Houston Chronicle* website, chron.com, (and published originally on the website *The Lily,*) explains how several female academics have been disproportionately impacted by the COVID pandemic.

One of them is **Aide Macias-Muñoz,** a UCSB postdoctoral fellow who studies the evolution of eyes in jellyfish. She said that, with day care for her daughter being closed during the pandemic and her husband working as a hospital emergency-room physician, she decided to start applying for jobs in the fall, a year earlier than she had planned, rather than continue to bolster her resume with new research. Why? She knew she would have little time for research in the foreseeable future and wanted to avoid competing with colleagues who had been able to do more work than usual during the pandemic. While balancing work and parenting, her productivity dropped dramatically, and she went from publishing two to three peer-reviewed scientific papers per year prior to 2020 to none in 2020.

In the article, Macias-Muñoz reported having applied for eight tenure-track assistant professor positions. As of mid-April, she had received no offers but was waiting to hear from several schools. After one rejection, she asked for feedback and was told, according to the article, that "to be a stronger candi-

date, she needed to publish more articles."

Even cluster hiring is a relatively slow process for enhancing diversity, simply because few faculty positions are available in a given year. It takes even longer if good candidates are not seen, something on the mind of chemistry professor **Javier Read de Alaniz.**

He explains that a great many highly qualified candidates go unseen by major universities, simply because they earn their PhDs or do postdoctoral work at schools other than the top five — often, because no pathway existed for them to get to those schools — which makes them invisible during faculty searches at top research institutions.

"I don't think I realized until recently how

groups and others who have less privilege lack access to those networks and connections that keep them in the pipeline long enough to get into a faculty position."

One fairly easy first step to take in expanding visibility of scholars from URGs, he says, is, "If you have seminars, bring in seminar speakers who are not from those top five schools. We often hear the assumption that 'there's not enough talent out there,' but I don't think that's true. I think we need to widen our scope to uncover the talent from diverse places."

Chemical Engineering Department chair, **Rachel Segalman,** is answering that call for broader minority representation in seminars.

gets seen by the community."

After every seminar, each of which has had between 50 and 150 viewers, with more than 600 unique registrants, a small rotating cohort of department and search committee chairs stays on the line with the speaker for a half-hour, providing mentorship, encouragement, and information about how to apply for faculty positions.

The organizers began advertising for applicants in summer 2020 and received more than 120 applications, with space for 50 speakers through the year. "We were trying to attract people who might have gone for a job search this year but are delaying because so few faculty searches are occurring during the pandemic, but who, without some encouragement, might drop out of the pipeline and get an industrial job," Segalman says.

> "On one hand, we lose students from the pipeline, and on the other, we don't know who's in the pipeline nationally, so we can't address the problem. A national seminar series is a great place to start. We can provide some positive feedback as a broader community to a student who is considering a faculty job search in the future."

much is taught informally as you go through the system to get your PhD," Read de Alaniz says. "So much information gets passed on that is not written down or learned in a class. You end up having a series of missed learning opportunities, and that leads to talented candidates being overlooked based on what institutions people attended and on which schools faculty on hiring committees are familiar with. It's unintentional; when you're busy, it's so easy to fall back on what you know."

But it has the effect of perpetuating the cycle of invisibility and the resulting underrepresentation, of minorities in faculty searches, he says: "The number of STEM faculty who did not come through Berkeley, MIT, Harvard, CalTech, those kinds of institutions, is extremely small. If you don't make it to one of those as an undergrad, a graduate student, or a postdoc, getting a faculty position becomes extremely challenging.

"People call it a pipeline issue, but I think of it more as a network issue, and it limits hiring," he adds." For better or worse, privilege allows some people to get into networks and institutions, which puts them on their way, whereas people from underrepresented

Last summer, she and colleagues at the Massachusetts Institute of Technology, UC Berkeley, and the University of Florida launched a National Chemical Engineering seminar series on Zoom focused on the diversity of the discipline and future faculty. Segalman says that the series reflects a goal shared broadly by universities nationwide, which is "to have our faculty look more like our current and future students and the broader society. It's important to have that representation, but right now, the pipeline isn't there to support it."

Because of that, she says, "On one hand, we lose students from the pipeline, and on the other, we don't know who's in the pipeline nationally, so we can't address the problem. A national seminar series is a great place to start. We can provide some positive feedback as a broader community to a student who is considering a faculty job search in the future."

Segalman and her colleagues advertised the series widely, inviting graduate students and postdoctoral researchers to give a presentation to a Zoom viewing community of both faculty and students across the country. "That representation is important," she says. "The audience sees the speaker, and the speaker

Applicants were asked for a resume and an optional letter of recommendation. They were informed that one of the organizers' goals was to improve the visibility of diversity in the discipline and were asked, "How are you going to help us attain that goal?"

"We got responses from a large group of graduate students and postdocs who are active in the community and doing important things, and you want to reward that," Segalman explains. "We received answers from students with all sorts of backgrounds who have come to this point via really interesting and unusual ways. Some were people we as Americans would consider underrepresented minorities, first-generation college students, and non-traditional students. Others came from countries that have a strong caste system, so someone who might be an underrepresented minority in their own culture."

"We've had speakers from parts of the world that have educational systems very different from those in the U.S. We've had speakers who were from indigenous groups in various regions of the world, and from minority groups in a variety of places. We've had people from LGBTQ backgrounds, who are well represented in some parts of the world and not in others. So, the question, *How are you going to help us increase diversity in the field?* means different things to different people and broadens the field."

Segalman reports that the seminars were watched by search-committee chairs from many schools that were running searches, noting, "We made the seminar list public, and they've actually been recruiting from it, so, in that sense, it's serving that purpose."