MINES MAGAZINE
For Colorado School of Mines Alumni and Friends ▲ Spring 2025

IMPROV + INSTRUMENTS & IMAGINATION

Through a blend of technical rigor and creative learning, Mines is preparing students to drive innovation and become well-rounded leaders.

PLUS:
Orediggers can level-up their careers with a new professional education platform that provides a tailored learning experience.

Mines alumni, students and faculty are using their unique skill sets to start unexpected businesses, work in influential spaces and make a difference in their communities.

@COLORADOSCHOOLOFMINES

The Oredigger and Golden communities gathered on the banks of Clear Creek to watch the ever-popular cardboard boat race during E-Days this spring. Check out more photos from this year's celebration on pages 42 and 43.

Follow Mines on social media for more great shots of the Mines community and to keep up with everything happening with your fellow Orediggers.

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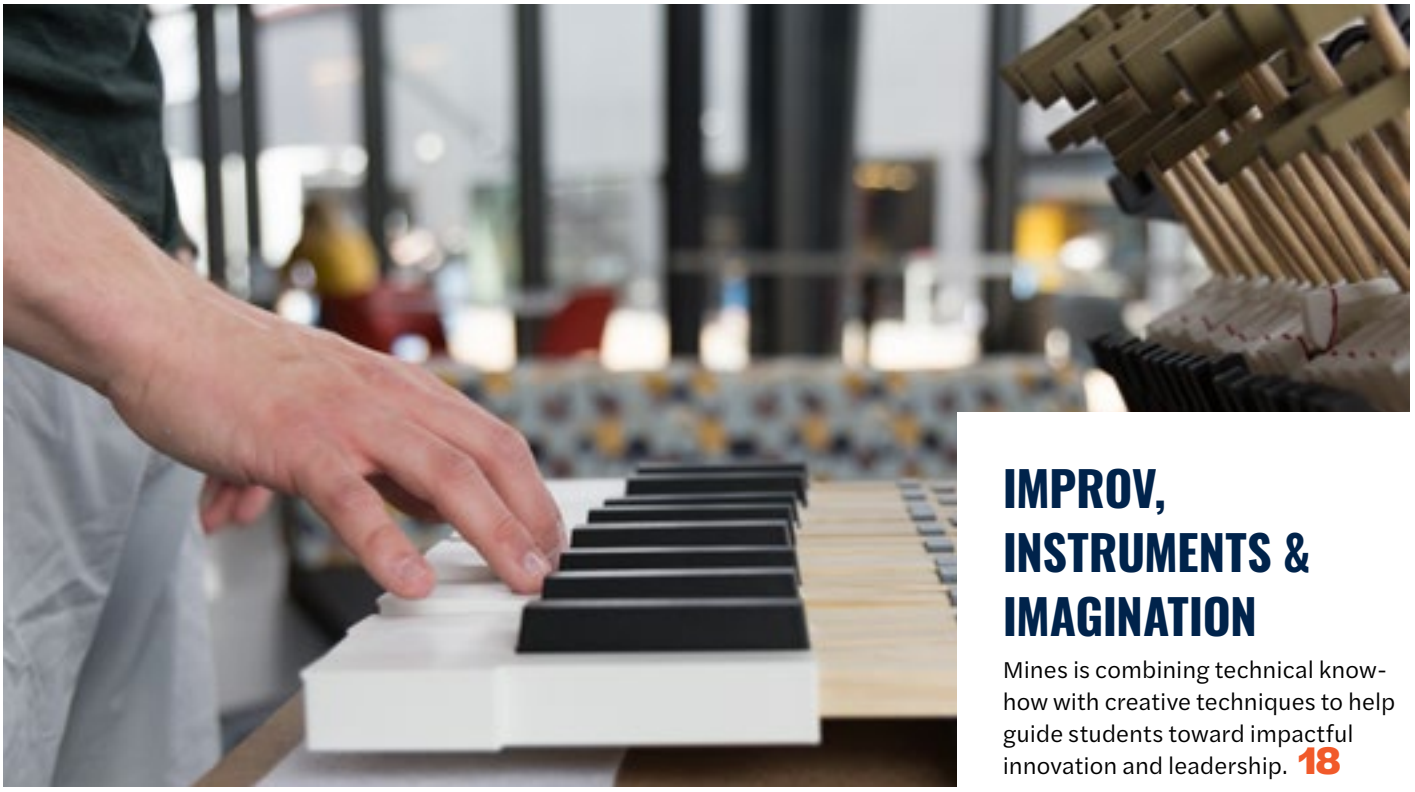

IMPROV, INSTRUMENTS & IMAGINATION

Mines is combining technical know-how with creative techniques to help guide students toward impactful innovation and leadership. 18

INSIDE **MINES**

BIG **IDEAS**

ALUMNI **NETWORK**

SKILL **SET**

On the cover: Geological engineering student Luke Hanson is one of the inventors of the "Xylofraud," a musical instrument that was designed and built as part of the "Reevaluation of Design and Sustainable Future of Musical Instrument" class offered at Mines.

THANKS TO YOU,

the most successful campaign in Mines' history wraps on June 30!

THE CAMPAIGN FOR MINES @ 150

THE CAMPAIGN FOR MINES@150 ENABLED:

- Entrepreneurship & Innovation Ecosystem
- Professional Development Programming
- Enhanced Business Programming
- Athletics Success
- Endowed Chairs and Programmatic Support
- Great Students and Great Faculty

YOUR IMPACT

BY THE NUMBERS*

$546M
Total Raised

$215M
Raised for the Endowment

30K+
Donors

75K+
Total Contributions

312
New Scholarships & Fellowships

*10/1/2016–3/13/2025
Numbers may be rounded

AN OREGIVER'S WORK IS NEVER DONE
EMPOWER POSSIBILITIES BEYOND 150.

BALL GOWNS AND BREAKAWAYS

Prom dresses and powerful play collided on the pitch for Prom Dress Rugby

Peanut butter and jelly. Macaroni and cheese. Contact sports and...formal wear?

The Mines women's club rugby team made this unlikely pairing a reality at the annual Prom Dress Rugby game in April 2025, which kicked off this year's E-Days celebrations. The team donned fancy gowns while they scrummed and rucked, all with the intention to raise awareness about women's rugby. Here are some of our favorite shots from this year's event.

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LEADERS IN LEARNING, CHAMPIONS IN ACTION

Innovation, collaboration and competition fuels Oredigger success

At Mines, we're committed to preparing our students to be technical experts and versatile leaders capable of making a meaningful impact in a rapidly changing world. Our dedication to developing engineers and scientists who excel both academically and outside of the classroom is reflected daily in the success of our students and alumni.

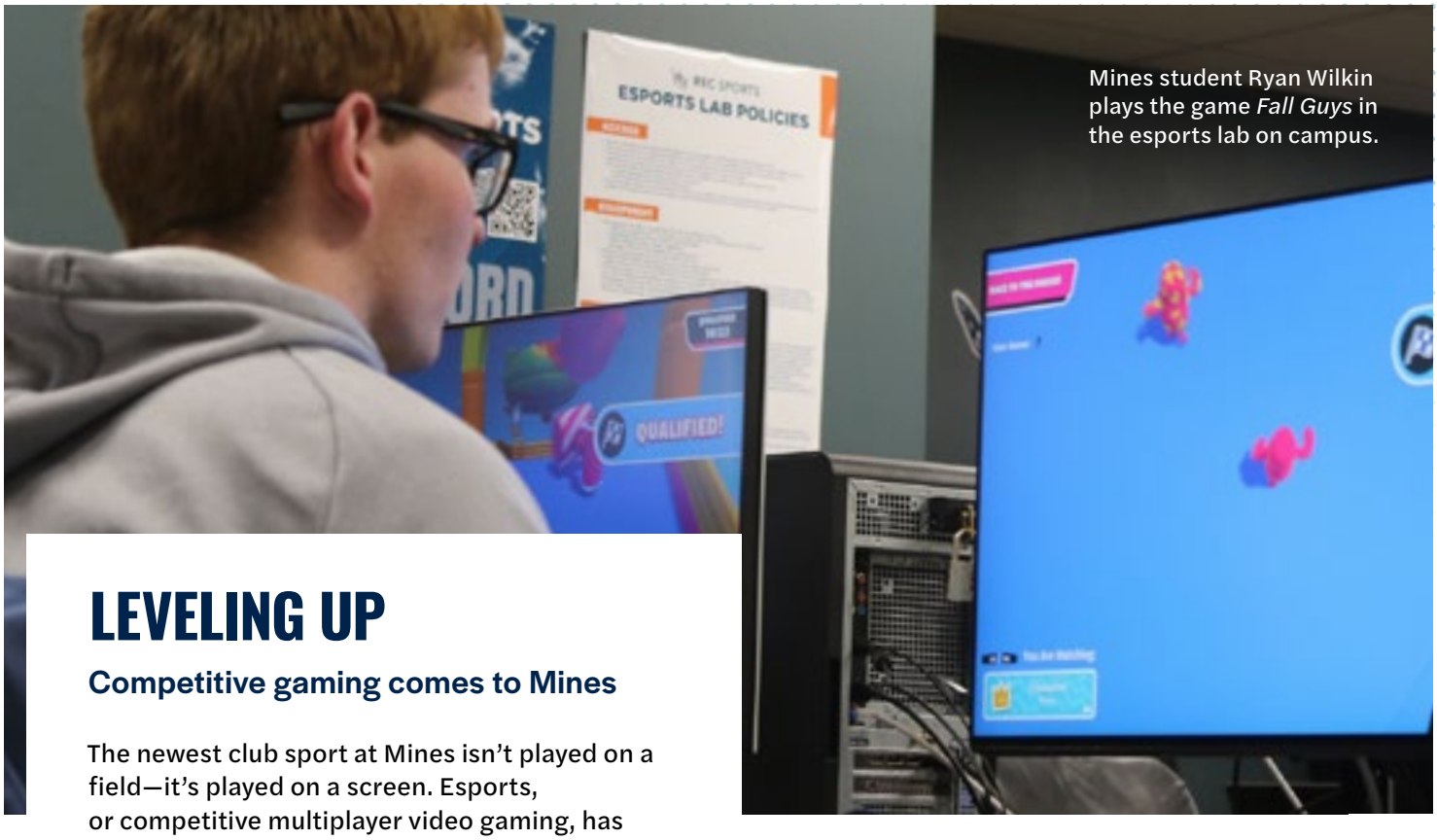
From winning prestigious national competitions like the national Battery Workforce Challenge, the International Mining Games and launching a rocket more than 40,000 feet above Earth to producing NCAA national champions and the most Academic All-America student-athletes in NCAA Division II history, Mines students continue to showcase their talent, determination and diverse skills. These accomplishments are a direct result of the abundant opportunities they have to engage in hands-on projects, collaborate across disciplines and develop leadership skills that will serve them throughout their careers and lives.

Mines offers a unique environment where these experiences are readily available. As you'll read in this issue's cover story, students build a strong technical foundation at Mines while also learning how to communicate complex ideas, collaborate across disciplines and connect their work to society. Their involvement in teams, student organizations and other extracurricular activities allows them to lead, problem-solve and think creatively in ways that complement their technical expertise, fostering adaptable engineers and scientists who are ready for whatever lies ahead.

As alumni, you and your success are living proof of the transformative power of the well-rounded Mines experience. I'm incredibly proud of what our students, faculty and alumni continue to achieve, and I look forward to seeing how Mines graduates will continue to build on their Mines experiences and reach even greater heights.

Go Orediggers!

Paul C. Johnson
President and Professor



Mines student Ryan Wilkin plays the game *Fall Guys* in the esports lab on campus.

LEVELING UP

Competitive gaming comes to Mines

The newest club sport at Mines isn't played on a field—it's played on a screen. Esports, or competitive multiplayer video gaming, has arrived on campus with a dedicated space for teams to train and compete.

WHAT ARE ESPORTS?

Esports refers to video games that are played in a highly organized competitive environment. Students form teams to compete in leagues and tournaments.

MINES OFFERS TEAMS FOR THE FOLLOWING GAMES, SOME COMPETITIVE AND SOME NON-COMPETITIVE:

Tom Clancy's Rainbow Six Siege

Overwatch 2

Counter-Strike: Global Offensive

League of Legends

Rocket League

Super Smash Bros. Ultimate

Call of Duty

Dota 2

Valorant

> "I THINK WHAT I LOVE MOST ABOUT ESPORTS IS ALWAYS HAVING THE ABILITY TO IMPROVE. THERE'S VIRTUALLY NO SKILL CEILING TO THE GAME, SO THERE'S ALWAYS GOING TO BE SOMEONE BETTER THAN YOU. FOR ME, THIS GIVES ME A CONSTANT DRIVE TO IMPROVE AND LEARN NEW THINGS IN ORDER TO OUTDO MY OPPONENTS THE NEXT TIME I FACE THEM."
>
> -Aaron Jackson, *Counter-Strike: Global Offensive* team captain

WHERE DO TEAMS PRACTICE AND COMPETE?

The new esports lab is now open at 1600 Jackson St, Room 010. The space features 12 high-performance PC setups for popular games. It also includes a fully equipped streaming studio with cameras, microphones and a green screen for broadcasting live to Twitch or YouTube.

→ Learn more about esports at Mines at **minesathletics.com/sports/clubesports.**

TOP NEWS AT MINES

Keep up with the latest Mines news at **minesnewsroom.com**.

STEFANIE TOMPKINS NAMED NEW MINES PROVOST

Stefanie Tompkins was appointed as Mines' next provost, effective May 12, 2025. Tompkins, who most recently served as the 23rd director of the U.S. Defense Advanced Research Projects Agency (DARPA), brings a distinguished career in scientific research, public service and executive leadership to Mines.

Tompkins is no stranger to Mines, having served as vice president for research and technology transfer before returning to national service at DARPA.

"Stefanie's extensive executive leadership experience in a technology innovation-focused organization like DARPA is what Mines needs now. That, combined with her passion for Mines' mission and love for the Mines community, makes her an exceptional choice to lead the university's academic enterprise," said Mines President Paul C. Johnson.

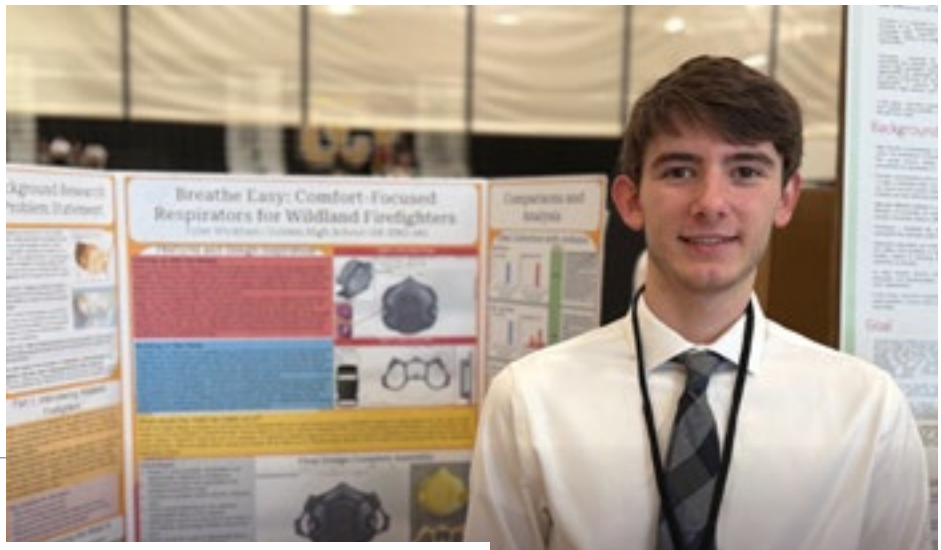
As provost, Tompkins will be responsible for shaping the faculty, students and academic programs so that Mines continues to excel in its mission of producing the talent, knowledge and innovations that industry and society need and continues to advance toward its aspiration of being a top-of-mind and first-choice university for students, faculty and external partners. The Provost's Office also leads enrollment management, initiatives to increase student retention, graduation and success and Mines' new facilities and programs related to innovation and entrepreneurship.

> "MINES IS AN EXTRAORDINARY INSTITUTION, KNOWN FOR ITS RIGOROUS ACADEMIC PROGRAMS, WORLD-CLASS FACULTY, EXCEPTIONAL VALUE PROPOSITION AND CULTURE OF INNOVATION AND PROBLEM-SOLVING," SAID TOMPKINS. "I LOOK FORWARD TO WORKING WITH PRESIDENT JOHNSON, OUR FACULTY, STUDENTS AND STAFF TO SUPPORT THEIR SUCCESS AND FURTHER ELEVATE OUR ACADEMIC EXCELLENCE AND RESEARCH IMPACT."
>
> -Stefanie Tompkins

COLORADO SCHOOL OF MINES, JEFFCO PUBLIC SCHOOLS ANNOUNCE GUARANTEED ADMISSIONS PATHWAY FOR STEM STUDENTS

Mines and Jeffco Public Schools (Jeffco) are partnering to create a guaranteed admissions pathway to Mines for local high school students with an aptitude and interest in science, technology, engineering and mathematics.

Beginning with the Class of 2026, Jeffco students who maintain a cumulative unweighted GPA of 3.8 or higher, complete advanced math and science coursework and graduate with a STEM-endorsed diploma from any high school in the district will be eligible for guaranteed admission into any four-year Bachelor of Science degree program at Mines. Students must also apply by Mines' November 1



Tyler Wickham, a senior STEM Capstone student at Golden High School, presents his project on respirators for wildland firefighters.

Photo courtesy of Jeffco Public Schools

priority deadline and meet all standard admission requirements.

"The opportunity for our students who are passionate about STEM to build on the current skills and experiences they develop in high school and directly transition to a prestigious institution like Mines is both inspiring and a meaningful investment in their education," said Jeffco Superintendent Tracy Dorland.

"This partnership creates an exciting new entry path to Mines for local students and rewards them for earning a STEM-endorsed diploma while in high school," said Mines President Paul C. Johnson. "By providing a guaranteed admissions pathway, we are ensuring that Jeffco students who demonstrate excellence in STEM have the opportunity to pursue a world-class education and earn a highly valued degree while staying close to home."

Jeffco students pursuing the STEM endorsement are required to take four years of college prep math (or advanced math) and three years of lab science and complete a Senior STEM Capstone Project. STEM Capstone is a year-long, hands-on course where 11th and 12th-grade students tackle real-world challenges by designing, prototyping and presenting innovative science and engineering solutions.

HELLUVA WELCOME HONORED AS 2025 INNOVATIVE ORIENTATION PROGRAM

Helluva Welcome—the weeklong August orientation program for all first-year students at Mines—has been named the 2025 Innovative Orientation Program award winner for Region III by NODA: Association for Orientation, Transition, and Retention.

The annual award recognizes innovative and effective approaches to orientation programming, highlighting good administration and practices that meet the changing needs on college and university campuses.

Launched in 2024, Helluva Welcome brought together multiple spring and summer orientation programs at Mines into a single weeklong experience for all incoming students right before the start of the fall semester. As part of Helluva Welcome, students move into their residence hall, spend time getting to know campus and build connections in the Rocky Mountains at Oredigger Camp as they take their first steps in their Mines journey. The program and Mines' Office of New Student and Transition Services were honored during the 2025 Regions III & IV NODA Conference at the University of North Texas in March 2025.

As a regional award winner, Helluva Welcome is also in the running for the 2025 Innovative Orientation Program Award on the national level. Each of the nine regional winners will be considered for the national award, to be given out at the annual NODA Conference in October.

LEGENDS RETURN, TITLES STAY

With a championship mindset and Bob Stitt back in the mix, Mines Athletics is aiming for it all

MINES WOMEN'S TRACK AND FIELD WINS THIRD STRAIGHT RMAC TITLE

Mines women's track and field secured its third straight RMAC Indoor Championship this spring, clinching the title in a nail-biting finish.

The title came down to the final event—the women's 4x400 relay. The Orediggers needed to place sixth or better to secure the championship. Mines runners Maya Evans, Avary Catchings, Allison Comer and Avery Wright finished the relay in 3:54.25 and secured a third-place finish.

Overall, Mines scored 140.5 points at the conference meeting, narrowly defeating the University of Colorado Colorado Springs, which finished with 131.5 points.

Wright was named Athlete of the Meet for her standout all-around performance, which included gold in the pentathlon, silver in the 60m hurdles, sixth place in the shot put and anchoring the 4x400 relay to bronze. Margaux Basart earned the RMAC Summit Award for the highest GPA among championship competitors.

For field events, Jennifer Janagin earned gold in the weight throw and Kitt Rupar took bronze in the shot put.

On the men's side, the 4x400 squad tied UCCS for silver in a dead heat finish. The men's team scored a total of 160 points to finish second with five first-place finishers, including Everett Delate for the 60-meter hurdles; Nick Stade for the heptathlon; Jonah Fallon for the 400-meter race; Tim Thompson for the 800-meter race; and Loic Scomparin for the 3K race.

It was a true team effort across the board with standout performances that pushed Mines to another championship season.

BOB STITT RETURNS AS HEAD FOOTBALL COACH

Bob Stitt, who put the Mines football program on the national map in the early 2000s and led the Orediggers to new heights, will return as the program's head coach.

"I am excited to welcome Bob Stitt back as the head football coach at Colorado School of Mines," said Director of Athletics David Hansburg. "Coach Stitt has proven he can win at Mines, and he has a tremendous ability to coach and

develop players. His success with limited resources during his first tenure with the Orediggers gives me confidence he can help us win a national championship with our program where it is today."

"My family and I are thrilled to be back at Mines and for me to once again lead the Oredigger football program," Stitt said. "I cannot thank David Hansburg and President Johnson enough for giving me the opportunity to return to the place that I love, that gave me my start as a head coach and where my family considers home."

First arriving in Golden in 2000, Stitt compiled a record of 108-62 during his 15 seasons at Mines, and he is the program's all-time leader in wins. In 2004, the Orediggers won their first RMAC title in 46 years and earned the program's first-ever NCAA championship berth and postseason win. Stitt would go on to lead Mines to conference titles and NCAA appearances again in 2010 and 2014. Stitt was the RMAC Coach of the Year in 2004 and 2010 and the AFCA regional coach of the year in 2004. He coached 16 All-Americans, 31 All-Region selections and 129 all-RMAC performers, along with 2004 Harlon Hill Trophy winner Chad Friedhauf and 2010 finalist Clay Garcia, during his 15 seasons. Stitt was inducted into the Mines Athletics Hall of Fame in 2021.

"There is no doubt in my mind this is the best job in Division II football, and I take the responsibility of maintaining the football excellence that has been established here very seriously,"

Stitt said. "Our staff will work diligently to put our players in a position to win championships at the highest level each and every season."

Stitt's first tenure put Mines on a path to success that it still enjoys today. Prior to his hiring, Mines had only one winning season in the previous two decades; since 2007, Mines has had 17 consecutive winning seasons, including seven or more wins each year since 2013. Stitt developed a national reputation as an offensive innovator while at Mines, and his teams set virtually every program offensive record including many that still stand.

Have you heard that Mines Athletics launched a new online ticketing platform? The new ticketing portal, launched in cooperation with Vivenu, is a one-stop hub for fans to purchase tickets and get game day information, while also making it easier to find and get seats to your favorite Oredigger athletic events. Check it out at **tickets.minesathletics.com.**

PUTTING RESEARCH SKILLS FIRST

Undergraduate research fellowship program gives first-year students direct research experience

BY JASMINE LEONAS

When Marco Salgado was accepted into Mines, he was undecided on what major he wanted to pursue. But he did know of Mines' strong reputation in the oil and gas industry.

"Being from the north of Texas, oil and gas is a big part of the economy over there, so when I started thinking about college, I looked at universities with good petroleum programs," Salgado said. "Of course, Mines is one of the top ones. I applied, not thinking I would even get in, but I did. And when I got accepted, I figured I'd give it a shot, even though I wasn't sold on going into oil and gas. I really didn't know what I wanted to do."

Then, Salgado found the FIRST program.

FIRST—short for First-Year Innovation and Research Scholar Training—is a selective fellowship program for highly motivated first-year students at Mines to participate in research with a focus on innovation over the course of an academic year. FIRST students are introduced to academic research, connected with a faculty or graduate student mentor and take part in hands-on work in research labs on campus. At the conclusion of the paid fellowship, FIRST students present their work at the Undergraduate Research Symposium, which takes place twice a year.

"Getting students involved in research early is key to their academic and professional growth," said Lakshmi Krishna, founding director of Undergraduate Research Scholars. "To make this happen, we created a program just for first-year students, offering one-on-one advising and dedicated funding—helping them get off to a strong start in research."

For Salgado, FIRST was a way to expand his experience in the sciences. He connected with Andy Herring, professor of chemical and biological engineering and vice provost of strategic initiatives, who introduced Salgado to electrochemistry.

Caitlyn Castellion, who participated in the FIRST program, conducts research with Assistant Professor Ramya Kumar.

"FIRST really is the reason that I was able to figure out, hey, this is what I want to do," said Salgado, who is now majoring in chemical engineering. "I had no idea what electrochemistry was when I started, but I just thought it sounded cool. I figured I'd give it a shot, and now, three years later, this is the thing that I love, and it's what I want to do with my career."

For Caitlyn Castellion, whose parents are both researchers, conducting research was always in her future. FIRST seemed like the perfect way to jump-start her time at Mines.

Castellion was paired with Ramya Kumar, assistant professor of chemical and biological engineering, who is researching the use of polymers in delivering genome-editing proteins in genetic therapies.

"The drugs of the future will be DNA-based drugs, so you need a completely different tool kit in order to make those kinds of drugs, and that's where engineers are solely needed," Kumar said. "There are a mix of skills that go into this research project. It's a very exciting training opportunity for my students who are working on it, because they'll be exposed to all aspects of this research, and Caitlyn is a good example—I'm sure she'll be ready to pursue a PhD somewhere."

Castellion has been working on developing substrates for cell cultures to grow stem cells. Working with Kumar exposed Castellion to how chemistry, which she is majoring in, is a vital part of gene therapeutics, and how STEM disciplines can overlap and work together. Being part of FIRST also helped Castellion master her time management skills.

> "FIRST REALLY IS THE REASON I WAS ABLE TO FIGURE OUT, HEY, THIS IS WHAT I WANT TO DO."
>
> -Marco Salgado, chemical engineering student

"Having to learn to balance my research work on top of schoolwork was a really good thing to learn," Castellion said. "It's a lot to juggle, but I've had a 4.0 [grade point average] my whole time at Mines. I don't think I could do well in classes without research work as well, because that's something else to do that I really love, and I can also focus on that."

Both Salgado and Castellion said they hope to work toward earning a PhD, continuing to do research in the fields they've grown to love while also teaching the next generation of scientists.

Chris Caskey PhD '14 loads tile into a glaze kiln.

Photo courtesy of Chris Caskey

WHERE MUD MEETS METHANE

One company is turning sediment into tile—and plans to power it all with methane from abandoned mines

BY ASHLEY SPURGEON

Colorado's Western Slope is dotted with dormant coal mines, relics of an industry that once powered the region's economy. But today, the abandoned mines in the North Fork Valley are a growing environmental concern. Methane, a potent greenhouse gas naturally released during coal mining, continues to seep out from underground long after a mine has closed. It's a significant source of air pollution and a problem the local community has been eager to tackle.

At the same time, the region faces another pressing issue. Sediment from Muddy Creek, a tributary of the Gunnison River's north fork, has been steadily filling the Paonia Reservoir. The buildup has dramatically reduced the reservoir's capacity, threatening the area's water supply—a critical resource for a dry climate reliant on agriculture.

But Chris Caskey PhD '14 stepped in with a creative solution to both problems. He launched Delta Brick & Climate Company to turn the high-quality clay from the reservoir into bricks, pavers and tile. And rather than relying on conventional energy to manufacture the products, he saw the opportunity to use the very methane leaking from nearby mines to power the process instead.

"They really resonate with each other. If you have an artisan tile company, that's cool, and if you have a methane capture system where you're burning gas to get rid of it, that feels like a waste. If we can bring them together where both of these problems are using each other with synergy, that's what informs it for me," Caskey said.

Delta Brick currently fires their kilns with standard gas and electric heat as they look at potential sites for methane capture and utilization. They currently produce bricks and pavers, with Particular Tile, a sister company launched in 2022, producing custom clay tile.

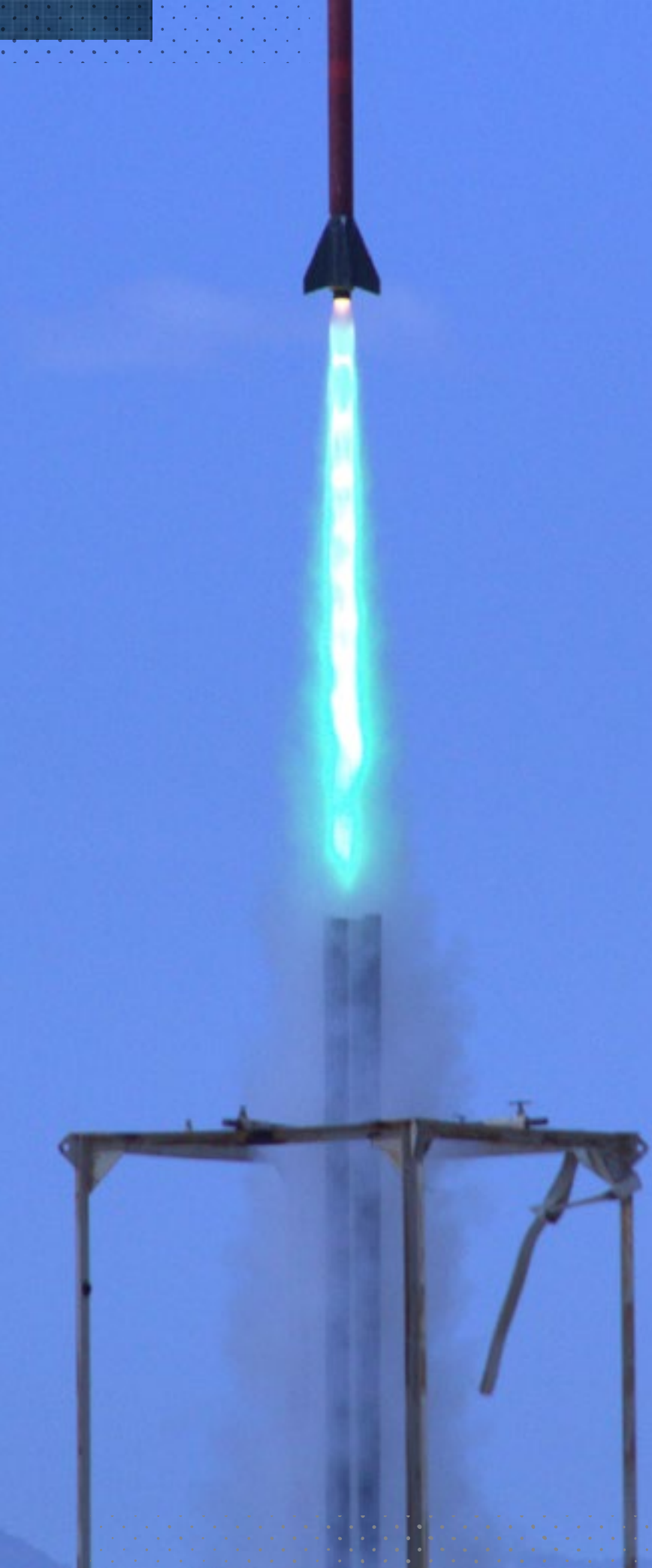
Once the manufacturing business was running smoothly, Caskey sold that side of the company to his factory manager so he could exclusively focus on the methane challenge. But bringing the two back together remains the end goal. He even recently purchased an abandoned coal mine and is working on figuring out how to effectively tap into the methane, build out a factory on-site and use the gas to power future manufacturing operations.

This work, Caskey believes, could offer more than just environmental benefits—it could also help shape a more stable economic future for the Western Slope.

"There are a lot of economic transitions happening in mining towns. We saw that happen many years ago with hard rock mining towns—places like Telluride and Leadville and Vail—that became recreation hubs. And that's happening with coal towns as well," Caskey said. "But there's a major affordability crisis when that economy flips, and the folks who did great work bringing us energy aren't necessarily the ones who get to reap the rewards of some of that economic change. If we still keep some sort of use for these old mine sites, including industrial and manufacturing use, it's not going to be as many jobs as the actual mine had, but it's the same skill sets to capture methane."

It's a complex and evolving landscape—one that demands creativity and a willingness to take on big problems. For Caskey, that's part of the draw.

"I like challenges. I like solving problems," Caskey said. "And I've been keyed into the climate challenge for a while and saw that as an opportunity to have some impact."



OUT OF THIS WORLD

From Earth to the Moon, Orediggers aren't just aiming high—they're landing there.

Orediggers are shaping the future of space exploration—one mission at a time. From designing systems on lunar landers to launching record-breaking rockets, Mines students and graduates are proving their impact in the aerospace industry is anything but minor.

In a historic first, Firefly Aerospace successfully landed their Blue Ghost lunar lander, making them the first commercial company to achieve a fully successful soft-landing on the Moon. Three Mines alumni played key roles in this milestone: Giuseppe Pasqualino '13 (vision systems engineer), Andres Ramirez '15 (thermal engineer) and Jackson Sweeney '23 (thermal engineer).

Mines alumni were also part of another major lunar moment when Intuitive Machines' IM-2 lunar lander touched down near the Moon's south pole in early March 2025. Though the lander ended up on its side 250 meters from its intended landing site, mission controllers were still able to accelerate several program and payload milestones before the lander's batteries depleted. This included a payload from Lunar Outpost, a Colorado-based company founded by Mines graduates. They deployed a rover called Mobile Autonomous Prospecting Platform, or MAPP, intended to test communications equipment, work to create a 3D map of the Moon's surface and take photos.

Closer to home but still sky high, the Mines Rocket Club launched a two-stage rocket named Fever Dream to 43,476 feet above California's Mojave Desert—the equivalent of 1.5 Mount Everests high. At maximum velocity, the rocket reached a speed of 2.3 times the speed of sound. This launch brings Mines into the top five in the world for university rocketry team launch altitude.

BUILDING THE FUTURE OF QUANTUM ENGINEERING

Mines' quantum engineering program is preparing students for challenges of working in the quantum industry

BY JOHN HIMES

In a laboratory in the basement of the CoorsTek Center for Applied Science and Engineering on the Mines campus, the overhead lights lend a strong yellow cast to the entire room.

It's not mood lighting: the photolithography materials used in the lab to make integrated circuits—also known as microchips—are sensitive to the bluer parts of the light spectrum, said Meenakshi Singh, associate professor of physics at Mines.

The lighting scheme isn't the only thing special about the quantum clean room. The density of particulate matter in the air is also tightly controlled—the room's Class 1000 rating means there's roughly 1,000 times fewer particles sized 0.5 micrometer and bigger per cubic meter of air than in ambient room air.

"Having access to a clean room is important because quantum devices are really small—the dust particles are of the sizes of the devices we are interested in," Singh said. "If they stick to your substrate, they ruin your device."

The clean room is just one of the facilities on the Mines campus where faculty and student researchers are tackling the unique challenges faced by the quantum industry.

"Quantum has traditionally lived in the physics domain, but the problems preventing scaling are engineering problems," Singh said. "They're materials, chemical, electrical and computer science problems. So, we take an interdisciplinary approach where we teach students what they need to know about quantum fundamentals, but in a very different way than how a physics course approaches it. Linear algebra is the only prerequisite."

Established in 2020, Mines' Quantum Engineering Program—one of the first in the nation—is preparing students for the practical engineering challenges of building quantum technology and working within the quantum industry.

Students get hands-on experience troubleshooting a cryostat. They know how lithography and silicon fabrication work. They understand microwave electronics.

These are the skills that industry is looking for because they enable engineers to work on components up and down the tech stack of a quantum system, said Singh, interim director of the program.

TRAINING STUDENTS FOR THE QUANTUM WORKFORCE

Quantum technology, ranging from computing to sensing to networking, could revolutionize the world just as digital technology has.

While long confined to the fringes, quantum has gained more mainstream interest in recent years. But the U.S. currently has only one qualified quantum worker available for every three quantum job openings, according to a 2022 study by McKinsey, a critical workforce shortage that could hold back the industry—and technology—substantially.

Students who go through the Quantum Engineering Program at Mines graduate well equipped to tackle hard problems in a field defined by precision engineering. Graduates are finding jobs with Colorado-based startups, national and international labs and major corporations pursuing quantum R&D. They're also embracing entrepreneurship and starting innovative companies that address real needs in the quantum marketplace.

"Quantum computers promise a revolution in science and quality of life that's on par with the silicon transistor, but the road to a useful quantum computer is far more difficult than the road to a classical computer," said Connor Denney, a PhD student in the program. "If we want quantum advantage to be a reality, engineers and scientists of every discipline will have to rise to the challenge. I want to be one of those engineers."

While working in the lab, Denney encountered an unmet need: an electronics system that goes into certain types of quantum computers.

He needed one for his lab, so he built one. Recognizing that other companies may also need this technology, he founded a startup to commercialize the system he built and has begun the process of taking it to market.

"My experience with hardware has been great for industrial readiness," said Denney. "Working in the clean room at Mines has also given me a new perspective on how to design and think about quantum chips."

The quantum engineering program's first alumni are also finding success in the field. Josh Moler '22 joined

PhD students Sam Saiter, center, and Bradley Lloyd, right, work with Physics Associate Professor Meenakshi Singh on the dilution refrigerator in one of the quantum labs on the Mines campus.

Maybell Quantum, a Denver-based developer of dilution refrigerators, which are used to cool quantum devices. His biggest takeaway from the program was the ability and confidence to solve complex problems that may seem impossible.

"Mines students never say, 'That's impossible,'" Moler said. "Give me a laptop and enough time, and I can figure it out."

His employer agrees. "Mines teaches folks to be thoughtful and flexible engineers," said Corban Tillemann-Dick, CEO of Maybell. "I can count on my Mines engineers to figure things out that haven't ever been figured out before."

INTERDISCIPLINARY APPROACH TO QUANTUM ENGINEERING

Elsewhere in the CoorsTek Center, Singh and her students are working on a dilution refrigerator that hangs from the lab's ceiling like a golden chandelier.

The refrigerator is used to cool Josephson Junctions down to near absolute zero—colder than interstellar space. This enables superconductivity, which is important for making solid-state qubits and quantum sensors.

"We're trying to improve quantum computers by increasing the operating temperature of silicon-spin qubits by understanding photon-electron coupling," Singh said. "We're also conducting fundamental physics research, such as understanding chirality-induced spin selectivity. This gives us insight into spin-orbit coupling, which underpins many quantum effects."

These projects, which aim to improve quantum technology and answer some of the most fundamental questions about the universe, are only a fraction of the quantum research happening at Mines. Other work ranges from exploring silicon clathrates as a potential quantum computing platform to testing the effectiveness of quantum algorithms to working with the Electrical Engineering Department on quantum interconnects.

"The quantum tech industry will benefit from the scientific and technological expertise of Mines faculty and graduates," said Fred Sarazin, professor and head of the Physics Department at Mines. "Mines has a long tradition of partnering with industry, and we look forward to contributing to Colorado's thriving quantum ecosystem."

→ Learn more about how Mines is supporting the future of quantum engineering at **quantum.mines.edu.**

Mines is elevating students' technical knowledge with creative techniques that fuel innovation and develop industry's next leaders

BY SARAH KUTA

IMPROV INSTRUMENTS & IMAGINATION

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On a sunny afternoon last fall, a group of Mines undergraduates gathered on the lawn outside Alderson Hall for their robotics class. They stood in a circle, clapping their hands and gesturing at each other while calling out, "Zip! Zap! Zop!"

Once they'd warmed up, they moved on to other improvisational theater exercises—like pretending to assemble an imaginary table and move it across the grass.

But what does improv theater have to do with robotics? Everything, if you ask Tom Williams, associate professor of computer science and director of the Mines Interactive Robotics Research Lab. That day on the lawn, Williams was demonstrating how useful theater-based role-play exercises could be for programming robots—more specifically, social robots that need to have realistic, human-like gestures. He was using improv to help his students become better robot designers.

"The skills necessary for successful improvisation are the same skills needed for social robots," he said.

The mash-up of improv theater and robotics is just one example of the many unique ways Mines is integrating the humanities into its science and engineering curriculum.

The university may be renowned for its technical rigor and expertise in applied science and engineering. But Mines is also enhancing students' education by seamlessly blending the humanities, arts, social sciences and other related fields into its curriculum—often, in surprising and creative ways.

The university's multidisciplinary approach—which goes far beyond Nature and Human Values—ensures students graduate not only as technical experts, but also as effective communicators, well-rounded professionals and good global citizens.

Through a variety of humanities-focused experiences and courses, Mines students learn to successfully navigate the human and community aspects of technology and innovation. They practice collaborating across disciplines, making ethical decisions and connecting their work to society—all while keeping different key stakeholders in mind.

And, by the time they graduate, Mines students have mastered storytelling techniques that help them effectively explain their research, engage with the public and articulate their ideas to diverse audiences.

"Having technical knowledge is extremely important," said Jerry Grandey '68, who started the Grandey Leadership by Design First-Year Honors Experience at Mines to help students learn leadership principles that they can carry throughout their professional lives. "But you're at a disadvantage if you can't communicate. Whether you're just solely technical or migrating into more of a supervisory or managerial position, ultimately, you need to be able to communicate effectively."

DESIGNING HUMAN-LIKE ROBOTS

Many of these experiences are offered through Mines' Humanities, Arts and Social Sciences (HASS) Department. But they're also sprinkled throughout the university's science and engineering classes—like Williams' Human-Robot Interaction course.

Offered through Mines' Computer Science Department, the class focuses on social robots—such as those used in some hospitals, airports and schools. For these robots to be useful and effective, they must be able to interact with humans through verbal and nonverbal communication. This means the professionals designing and programming them need

In classes like Human-Robot Interaction at Mines, students are improving social robot design by using techniques learned from improvisational theater.

to think critically about how they should look, sound and move.

"If you want the interactions to be fast, seamless, comfortable and natural to people, then you need to account for the types of interactions that humans find to be comfortable and natural," said Williams. "You don't want to have to train people how to use a robot. People need to be able to rely on what they know about human-to-human interactions to interact with social robots."

Often, before they start programming, designers will act out specific scenarios or behaviors they think might be useful for their robot. Several years ago, Williams realized the skills new performers learn in improv theater—something he does as an art form in his free time—are the same skills we're trying to give robots. The skills as they're thought about in improv theory can serve as a blueprint for social robot design requirements, and the ways those skills are taught to improvisers can serve as a blueprint for social robotics design education.

"I started thinking, maybe what we are doing in social robotics is really the same thing—it's just, instead of training an actor to carefully observe their improv partners and formulate an appropriate response using natural body language and gaze and gestures, we're doing it with robots that are otherwise not very sociable," he said.

In Fall 2024, Williams brought in members of a Denver-based improv troupe—named, fittingly, Not My Robot—to lead his students through various improv games and exercises. Toward the end of the session, students also acted out storyboards they'd sketched depicting envisioned interactions between their robots and humans. With feedback from fellow students, they revised their storyboards, which they later used to program their robots.

"Mines is so focused on building real technologies," said Williams. "If we want to be able to develop technologies that are actually used by real people and that are out in the real world, then it's really important for students to understand the human side of the equation. How do we know these technologies are actually helping people? What are the opportunities to meaningfully enhance human capabilities and human flourishing?"

INVENTING NEW MUSICAL INSTRUMENTS

Mines' humanities curriculum is also giving students a chance to use their hard-earned technical expertise in novel and fun ways. In many cases, these interdisciplinary projects and classes end up being some of the most memorable experiences students have during their time at Mines.

That's how current Mines student Jonah Booth feels about the "Xylofraud," a quirky musical instrument he helped invent during his Reevaluation of Design and Sustainable Future of Musical Instrument class last fall.

Taught by Masakazu Ito, director of the Mines Philharmonic Orchestra, the course encourages students to think critically about how musical instruments have been designed and built historically—and how they might improve upon those designs or come up with new tune-producing gadgets altogether.

Booth's group decided to go the invention route. Their Xylofraud uses a piano's hammer mechanism to strike aluminum chimes of varying lengths, a setup that produces a whimsical, music box-style sound. Since the Xylofraud has just 20 keys—instead of the 88 found on a traditional piano—it's a smaller, more portable option.

The students spent the semester coming up with the idea, designing the instrument, fabricating the components and putting them all together. (No easy feat because, including screws, the Xylofraud has roughly 400 parts, according to Booth.) Then, they made a humorous video to explain their invention that has racked up more than 26,000 views and counting on YouTube.

The Xylofraud likely won't become mainstream. But, while building it, Booth said he learned many valuable lessons that will help him in his mechanical engineering career. Most notably, the project encouraged him to go big, take risks and embrace his creativity, even if that resulted in an imperfect outcome.

"We didn't have to dial the project back to follow specific guidelines or meet rubric requirements—

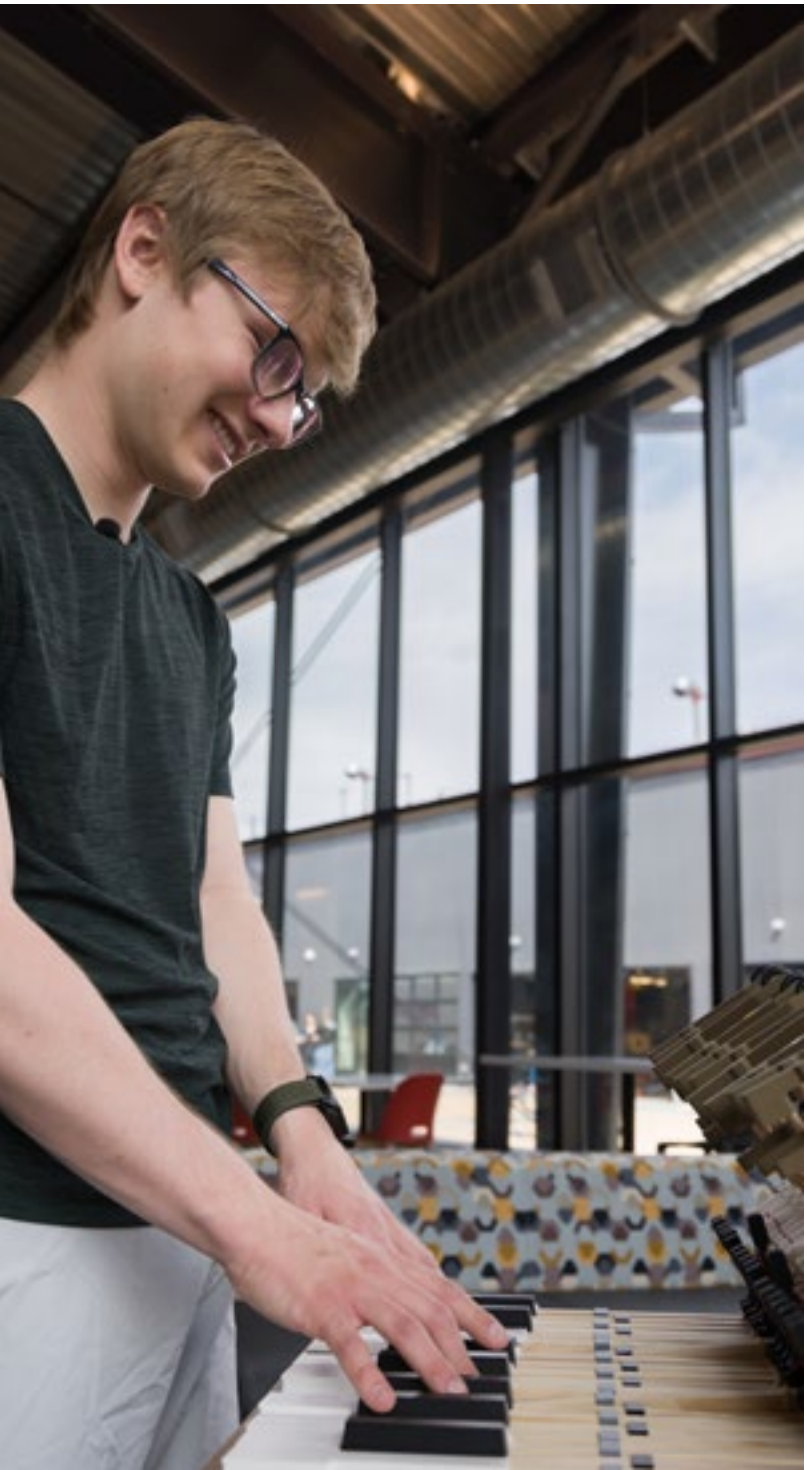
we could just go for it," he said. "Even failure was celebrated in that class—we didn't necessarily have to make something that works, as long as we tried."

Because of the freedom and flexibility the course gave them, Booth said his group decided to tackle a much more complicated, challenging project than they might have otherwise. That "boundless creativity" helped Booth stretch his engineering skills, he said.

In addition, he enjoyed working with students from outside his major. Everyone brought their own unique perspectives to the project, which ultimately made it stronger.

"The communication and teamwork skills you get from that are really valuable," said Booth.

In the end, the group produced something they were all extremely proud of—a brand-new, never-before-seen musical instrument.



Geological engineering student Luke Hanson is one of a team of students who invented the "Xylofraud," a musical instrument with 20 keys that uses a piano's hammer mechanism to strike aluminum chimes to produce a whimsical, music box-style sound.

EXPLORING WATER RIGHTS THROUGH PERFORMANCE

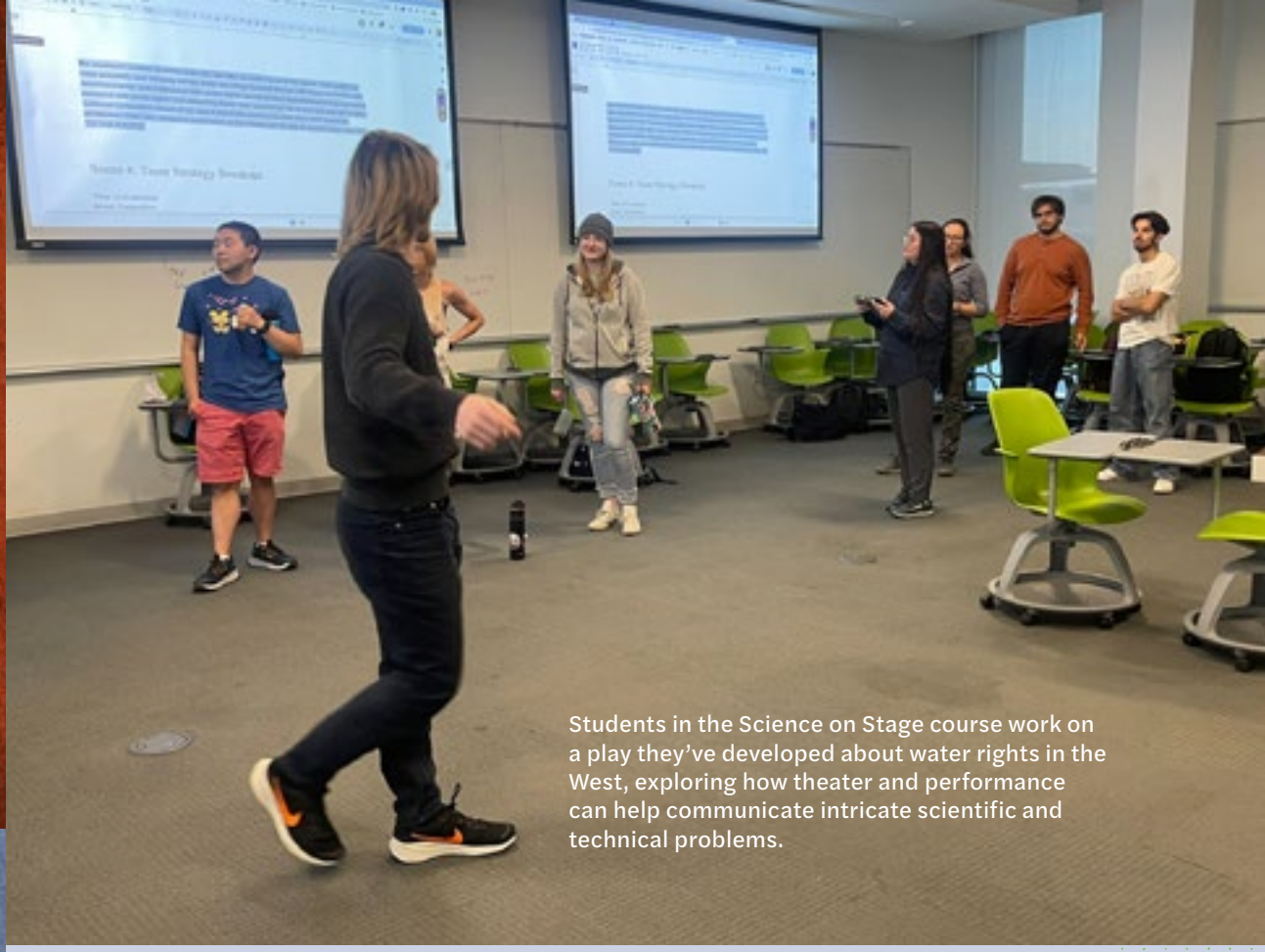
Other humanities courses help students think about long-standing problems in new ways—like water rights in the moisture-starved U.S. West.

Water rights can be confusing and boring to the average person. But they're vitally important for both policymakers and members of the public to understand. Shannon Mancus, an associate teaching professor and HASS associate department head, wondered if Mines students could help bring this often-overlooked topic to life by writing and producing a play.

Working with Adjunct Professor Joseph Bearss, she developed a project-based Science on Stage course to explore how theater and performance can communicate intricate scientific and technical problems successfully.

"Our students are so creative, they're incredibly good problem-solvers and they're excellent communicators as well," she said. "I had a sense that they would be able to pick up the idea and run with it—and boy was I right."

During the Spring 2025 semester, students learned about character development, studied the mechanics of immersive theater and investigated storytelling as an effective method for



Students in the Science on Stage course work on a play they've developed about water rights in the West, exploring how theater and performance can help communicate intricate scientific and technical problems.

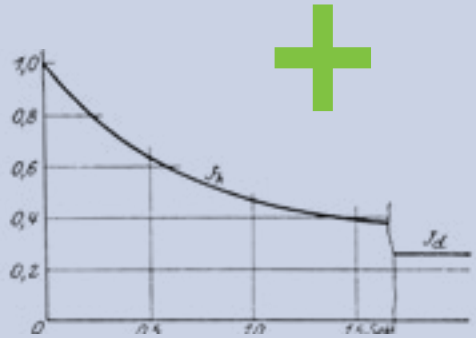
communicating environmental ideas. Using what they learned, they also put together a detailed creative guide that might someday serve as the blueprint for an immersive theater production about water rights.

With these and other HASS courses, Mancus hopes to encourage students to think outside the technical box. Nearly every scientific problem also has some sort of social or cultural component—and engineers must take those into account to be effective.

"Students understand that what they do doesn't happen in a vacuum," she said. "It happens in society and culture and it's important to understand how those things operate."

The humanities can also help students develop the soft skills they'll need to excel in their careers. Today's engineers must be technically competent, but they must also be emotionally intelligent, adaptable, collaborative, creative and thoughtful.

"Your engineering classes are going to get you a really great job," said Mancus. "The skills you learn in your humanities classes can help you get promotions."



Curious what the Xylofraud sounds like and want to know more about how it was designed? Check out the video see the instrument in action.

ECONOMIST TURNED ENERGY LEADER

Tisi Barlock MS '17, PhD '19 is helping secure the future of energy supply chains and policy

BY LYNN CLARK

Tisi Barlock MS '17, PhD '19 may not have envisioned her career being largely based around energy supply chains and natural resource policy, but she has spent the last several years working as an expert on the topic and even served as a senior advisor for the United States Department of Energy's Office of Manufacturing and Energy Supply Chains.

However, Barlock's journey to get to this point started long before she was presenting data and strategies to White House staff. In fact, before she earned her master's and doctoral degrees in mineral and energy economics from Mines, she had earned a master's degree in economics at the University of Dar es Salaam in Tanzania and spent seven years as an economist in the country's Ministry of Treasury. She thought she'd begin a career in macroeconomics, but the treasury had another plan for her.

"When I started my first job, they told me they really needed people in fiscal policy," Barlock said. "The person in charge of fiscal policy told me, 'I want when people think about natural gas they think about your name.' I knew nothing about natural gas, but I did end up becoming an expert."

> "I NEVER THOUGHT, IN MY WILDEST DREAMS AS A GIRL LIVING IN A SMALL TOWN IN TANZANIA, THAT ONE DAY I WOULD BE TALKING TO ANYONE IN THE UNITED STATES WHITE HOUSE."

Barlock's job sent her around the world to resource-rich countries, where she learned how they were managing their natural resources policies. She even represented her country at the United Nations General Assembly. A couple years in, she led a cross-organizational team that created Tanzania's first Oil and Gas Revenue Management Policy and subsequent law, which passed in 2015.

"After that, I looked at the huge, complex decisions I was making, and I thought, 'Wow, I don't know enough,'" she said. "I looked at the impact the policy was making, and I was very excited. But I needed the confidence that came with in-depth study."

This ultimately led her to Mines, and she finished her master's degree and PhD in four years—remarkably fast. She then scored a coveted post-doctoral position at the National Renewable Energy Lab with respected green energy researcher

Jill Engel-Cox, who was instrumental in Barlock being considered for her DOE position just a few years later.

By the time Barlock joined the DOE, she was an expert on natural resources economics with a policymaking mind, but she didn't fully know how policy becomes law in the U.S.—she'd only had experience with Tanzanian processes. She had to learn on the job.

"It was intimidating at first, but I worked with a bunch of smart and patient people who walked me through how it works," she said. "We identified problems, produced analysis and policy suggestions, then hoped someone in Congress would pick it up—a different system to what I was used to. In Tanzania, the technical staff in the executive branch identify the problems, write the policy and a bill to address it and the respective minister takes it to Parliament for review, discussion and voting to into a law."

In the two years Barlock worked at the DOE, she led a department-wide effort to create policy on securing the U.S.'s clean-energy supply chain—the first of its kind. She then moved to the DOE's Office of Manufacturing and Energy Supply Chains as a senior advisor where her thought leadership was instrumental in designing two funded programs: the Heat Pump Defense Production Act and the 48C Advanced Energy Tax Credits program.

Now, Barlock works at Argonne National Laboratory as a supply chain specialist for the nuclear technologies and national security directorate.

"I never thought, in my wildest dreams as a girl living in a small town in Tanzania, that one day I would be talking to anyone in the United States White House," Barlock said. "Coming to Mines was the first step that made that happen—that put me in this position to make a difference."

JOIN THE CLUB

M Clubs help Orediggers stay connected to Mines—one city at a time

M Clubs are all about keeping Orediggers connected—both to Mines and to each other—no matter where life takes you. With 43 clubs worldwide (and growing), there's a good chance you've got fellow Mines alumni nearby. No membership dues, no obligations—just a great way to keep up with what's happening at Mines and with your fellow Orediggers. Make sure that both your mailing and email addresses are up to date to ensure you receive the proper communications about alumni events and programs happening near you.

WHAT YOU CAN DO WITH YOUR M CLUB

Socialize and network with other Orediggers: By joining an M Club, Orediggers have many opportunities throughout the year to meet up with other Mines graduates in a casual environment and get updates about what's happening at Mines, reminisce about their college experience, network or just chat with friends.

Participate in signature Mines events: M Clubs come together to celebrate their Mines pride at annual events like E-Days 'Round the World, Summer Welcome Parties, holiday celebrations and more.

Give back to your community: Many M Clubs organize community service events in their city, including volunteering at food banks, serving as volunteer judges at local high school science fairs and helping to maintain public hiking trails.

→ Connect with an M Club in your area at **weare.mines.edu/mclubs.**

INTERNATIONAL M CLUBS

Perth
Calgary
Beijing
Paris
Bremen
Lima
Dhahran
Port of Spain

BECOME AN M CLUB LEADER IN A CITY NEAR YOU

Mines currently has 50 alumni serving as M Club leaders in cities across the globe. These individuals help ensure their local Oredigger community is able to come together regularly for fun events and to stay up to date with everything happening at Mines. These volunteers meet virtually every quarter to welcome new leaders, share best practices, ideas for events and programs and hear updates about the Mines campus and community. The Mines Foundation provides all the tools and resources for each M Club to succeed.

Don't see an M Club near you? If there are enough Orediggers in your area, you can start a new one. In fact, four new cities were just added in 2025: Phoenix, Tucson, Minneapolis and San Antonio.

LUGGAGE LOGISTICS

Erik Knowles ’86 is helping the Seattle-Tacoma International Airport improve their mechanical systems to ensure seamless travel

BY SARAH KUTA

From strollers and backpacks to kayaks and pole vault poles, Erik Knowles ’86 knows luggage of all shapes and sizes makes its way through an airport. But no matter what passengers want to bring with them when they travel, Knowles helps ensure their beloved belongings make it through Seattle-Tacoma International Airport (Sea-Tac) safely and securely.

Knowles is an assistant director in the airport’s maintenance and infrastructure department, where he oversees a crew of more than 130 employees. His team works on all of the airport’s mechanical systems, but one of their primary responsibilities is what Knowles calls “the bag factory,” an outbound baggage handling system consisting of 10 miles of conveyor belts and dozens of Transportation Security Administration screening machines.

It’s a complicated logistical operation that runs nearly nonstop, and Knowles is tasked with keeping the machinery running smoothly. In 2024, more than 52.6 million passengers passed through the airport on their way to domestic and international destinations. For Knowles and his team, that meant processing more than 16 million total outbound bags—or between 40,000 and 50,000 pieces of luggage per day.

“We have to screen them for explosives, we have to sort them, we have to get them on the right airplane,” said Knowles.

> “THE AIRPORT IS FULL OF LIFE. IT’S VIBRANT. THERE ARE CRAZY THINGS THAT HAPPEN HERE, NOT ALL OF THEM GOOD. BUT THERE’S NEVER A DULL MOMENT.”

The airport was built in the 1940s, but after the 9/11 terrorist attacks, Sea-Tac and many other American airports had to be retrofitted with federal security screening infrastructure. Because of that, Sea-Tac’s current baggage handling system is a complex maze that’s akin to “a pile of spaghetti,” said Knowles.

“If you have an airport like ours that was constructed before 9/11, we’re space-constrained,” he said. “We have to shoehorn everything in—the building was never designed to hold this much.”

The existing baggage handling system was installed between 2001 and 2004, so it’s starting to show its

age. On top of that, Sea-Tac has experienced significant increases in passenger volume over the last decade—a trend that airport leaders expect to continue. In response, the airport is undertaking a $955 million, multi-phase project to not only modernize the bagging handling system but also accommodate anticipated future demand. The new infrastructure is also designed to be more efficient and more maintenance-friendly, said Knowles.

Because the airport is open 24 hours a day, 365 days a year, crews must keep the baggage handling system online amid the ongoing project. They replace small sections at a time and work in the middle of the night, during the short window between the last flight each evening and the first flight the next morning. When Knowles arrives at the airport each day, he helps ensure the new sections function as expected—and, if they don't, he troubleshoots and fixes whatever problems he finds.

The project feels a bit like "doing open-heart surgery while driving 70 miles an hour on the interstate," said Knowles. But, thanks to his Mines education and previous roles in manufacturing, Knowles is well-suited to the challenge.

The engineering work at Sea-Tac is rewarding, but Knowles also loves many other aspects of his job. He's a back-up snow plow driver for winter storms, and he's undergone high-level trainings on topics like incident management and terrorist identification.

"It's fun—it's a very lively place," he said. "The airport is full of life. It's vibrant. There are crazy things that happen here, not all of them good. But there's never a dull moment."

And when he's not solving technical problems in the belly of the airport, he likes to help lost passengers find their way. His security badge and his yellow safety vest are magnets for questions, he said.

"The airport can be intimidating, but we try to make it a very welcoming environment," he said. "We're like hosts—we represent Seattle."

TURNING FACULTY RESEARCH INTO A STARTUP REALITY

With a new Startup Fellowship, Mines helps academic faculty bring research to market

BY EMILIE RUSCH

Lori Tunstall never really pictured herself as an entrepreneur.

The assistant professor of civil and environmental engineering has been researching concrete durability and sustainability since her days as a graduate student at Princeton University. After earning her PhD, she did a postdoc, spent a few years conducting research at a national lab and then got her first tenure-track academic position at Mines.

"I never thought about starting a business as a viable option," Tunstall said. "Being an entrepreneur isn't something you're ever really exposed to unless you know someone—it's not a career path that gets discussed much."

But when her academic talks about the distinctive jet-black concrete she was developing in her lab at Mines—packed with carbon-sequestering biochar without sacrificing the durability, malleability and low cost of regular concrete—started getting noticed by industry representatives, they all had the same question: When is this going to be commercialized?

"It occurred to me that instead of teaching everyone else how to do it, I should just do it myself and sell it to them," Tunstall said.

Luckily, Tunstall and other budding faculty entrepreneurs at Mines can take advantage of the growing Mines Entrepreneurship and Innovation Ecosystem, which supports Mines-grown research that is ready to launch from the lab.

"No one can sell the technology better than the person who invented it, and that's something that investors and customers love," said Zack Bennett '99, director of the Beck Venture Center.

SUPPORT THROUGH A NEW FACULTY STARTUP FELLOWSHIP

A key way the Beck Venture Center is supporting faculty entrepreneurs is through the creation of a new Faculty Startup Fellowship. Faculty members get one year of complete or partial course relief—reducing or eliminating the courses they have to teach each semester—with the option to extend to a second year, along with monthly check-ins and support from the Venture Center.

"The beauty in something like this is helping faculty de-risk the technology so that they can make super big decisions in their lives," Bennett said. "Startups are hard enough—the stats are 9 out of 10 startups completely fail—but with faculty, they've worked so hard, focused their whole career on getting a tenured position and now they're at this tricky place: they have a world-class technology that should be commercialized and could be the foundation of a $1 billion company, but is it too risky for them?"

For Tunstall, the inaugural Faculty Startup Fellow, both the time away from teaching and the regular check-ins have been incredibly valuable since she started her fellowship in January 2025.

"I have hours of meetings with investors and potential customers and travel commitments—all of that would have been impossible to do while teaching without sacrificing the quality of the class offerings," Tunstall said. "It's really empowered me to be intentional about building the commercialization effort."

She named her company ZeroTwelve, a reference to the atomic weight of carbon.

"Concrete represents about 8 percent of all man-made CO_2 emissions—that's equivalent to all of the passenger vehicles on the globe right now," Tunstall said. "It's got a huge impact, and it's considered a hard-to-abate industry because the CO_2 emissions are part of the

process itself—to produce cement, you take limestone, calcium carbonate ($CaCO_3$), and turn it into free lime, calcium oxide (CaO), which releases CO_2."

ZeroTwelve's patent-pending concrete tackles that challenge by replacing upwards of 50 percent of the cement in the mix with biochar, the umbrella term for the carbon-negative materials produced from biomass sources, such as wood chips and agricultural waste, without any decrease in strength.

"It's a light lift for the concrete industry and it has huge environmental benefits," Tunstall said. "We hope to see it on sidewalks, on roadways, on foundations. It's distinctive, too—you can actually see the carbon being sequestered."

THE ADVANTAGE OF INVESTING IN MINES FACULTY INNOVATIONS

From a university perspective, investing in faculty entrepreneurship pays dividends on multiple fronts. Mines owns the intellectual property of faculty-developed technology and gets a percentage of the companies formed to commercialize them. Their success is Mines' success.

"Mines is super well respected, one of the best engineering schools in the world. The investor community is really interested in the faculty research coming out of here," Bennett said. "The companies they want to see are the ones commercializing Mines IP, those big, juicy, world changing-type companies."

Just as important, Bennett said, is the impact on campus culture that faculty-driven startups can have.

"We want researchers that have an entrepreneurial spirit to come to Mines because we create an environment that nurtures innovation and gives them lots of support and flexibility," he said.

Currently in the seed stage, ZeroTwelve is in its first fundraising round and has laboratory trials happening at global ready-mix producer sites. "The next big step will be scaling up to conduct pilot studies," Tunstall said.

"I don't want to see it die in the lab," she said. "I want to see it flourish in the real world."

ANOTHER MINES CONNECTION IS MAKING ZEROTWELVE POSSIBLE

Howard Janzen '76, MS '77 stepped in to be the company's CEO. Janzen is a seasoned entrepreneur and dedicated supporter of the Beck Venture Center and felt that taking an active role in Tunstall's business to help it find success was a natural fit.

This culture of support across the Mines community also ensures that innovative ideas emerging from the university have a greater chance of thriving in the real world and driving lasting change.

"Mines is at the forefront of technologies addressing some of the biggest challenges facing society today," Janzen said. "E&I skills help promote and sharpen the ability to drive change and deliver the superior outcomes that result from not sticking with the status quo."

Andrea Gioia '09 started Sunshine Wellness Adventures to provide triathlon and wellness training.

FUELED BY ENDURANCE

A Mines alum's entrepreneurial pursuit turns a love for athletic performance into wellness support for others

BY CYNTHIA BARNES

Andrea Gioia '09 knows how to go the distance—literally. Not only did she run cross country as a Mines student, but Gioia also placed second in the female category at the 2022 Alpha Win Hudson Valley Triathlon, a grueling 140.6-mile race combining swimming, cycling and running that requires guts, grit and extraordinary dedication. Today, she's helping others reach their own athletic performance milestones as the owner of Sunshine Wellness Adventures, which offers individual coaching for triathlons and other endurance sports, wellness camps and swim clinics.

Gioia started her professional career in GE's prestigious Commercial Leadership Program and worked her way up to the executive level in the software industry.

While climbing the career ladder, Gioia found stress relief—and solutions—in the physical challenges of triathlons.

"I worked through a lot of challenges in the water or out on the trail," she said.

She shared her love of triathlons with others, organizing her first unofficial event 13 years ago. "I just decided to organize one and invited my friends and family," she said. "They loved it—so much they asked to do it again."

This led her to begin coaching people who wanted to improve their performance in endurance activities. "This [was] not my primary job, and early on, I didn't make any money," Gioia said. "I just did it because I love it. I really appreciate what triathlon did for me and wanted to help other people have that same outlet."

But it wasn't until she underwent three hip surgeries to correct a congenital problem that Gioia took the downtime to reflect on her career and her passions. She ultimately decided to step away from her executive role and pursue a new career path.

"I really took time to reflect on what I wanted to do, what brings me joy and where my strengths lie," she said. "Within the first two weeks of my break, I launched two companies—one to advise startups, because I still wanted to stay connected to tech and use those hard-earned skills, and another focused on triathlon: wellness camps, coaching and training, because that's where I find real meaning."

The latter ended up becoming Sunshine Wellness Adventures, which now incorporates physical training with wellness sessions focused on mental resilience, nutrition and recovery techniques to help participants gain the skills, confidence and inspiration to pursue their goals on and off the racecourse.

Gioia credits the problem-solving skills she learned at Mines with continuing to help her face the challenges of business ownership.

"Every time I host a triathlon, something unexpected comes up. You never know what it'll be, but you have to figure out how to handle it," Gioia said. "I've had major road closures the day before a race, for example. You just have to problem-solve, make it work and keep clear communication with the athletes. I attribute that to my own experience at Mines."

→ For more information about Sunshine Wellness Adventures, local training campus and events, visit **sunshinewellnessadventures.com/events-2.**

ELEVATING CAREERS, EXPANDING KNOWLEDGE

A new professional education platform helps STEM experts stay ahead with a tailored experience

Mines graduates know that learning doesn't stop after earning a degree—especially in fast-changing STEM fields. That's why Mines ProEd, a new professional education platform, is designed to help professionals stay ahead of industry trends, sharpen their skills and take their career to the next level. Whether refining technical expertise, transitioning to a new industry or role, adapting to workforce shifts or upskilling a team, Mines ProEd offers practical, real-world training that meets professionals where they are. With flexible, industry-focused courses and workshops, Mines ProEd provides the knowledge and experience needed to remain competitive in a rapidly evolving job market—backed by Mines' renowned expertise.

→ For more information about Mines ProEd and to explore available courses, visit **proed.mines.edu.**

Mines alumni can get a 10 percent discount on your first five Mines ProEd courses. Get your exclusive discount code at **mines.edu/proed-alumni-discount.**

Why choose Mines ProEd?

1. **STEM-CENTRIC FOCUS:**
   Mines ProEd is meticulously designed to address both current and future STEM industry needs, ensuring today's professionals remain at the forefront of their fields.

2. **EFFICIENT LEARNING:**
   With distinctive instructional design, Mines ProEd emphasizes learning skills and competencies in the most efficient way, providing support across the learning progression. Flexible learning options are available, including online, hybrid and in-person opportunities.

3. **MINES EXCELLENCE:**
   Every course is backed by the unique expertise that only Colorado School of Mines can offer.

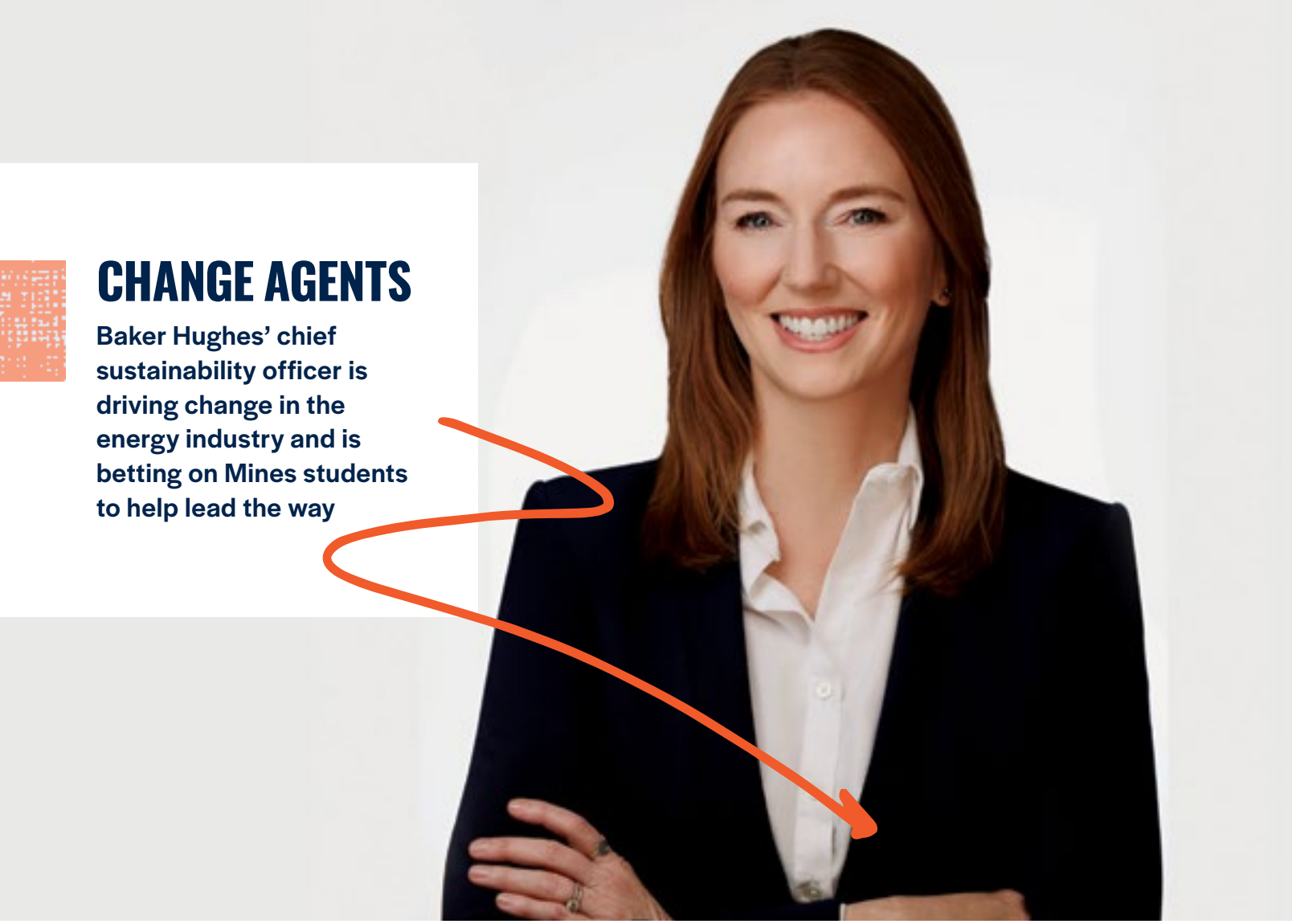
4. **CUSTOMIZED SOLUTIONS:**
   Mines collaborates directly with companies to develop specialized learning solutions on topics such as digital transformation, AI, ESG, decarbonization and more.

"LIFELONG LEARNING CONTINUES WELL BEYOND GRADUATION, ESPECIALLY AS YOU STRIVE TO TAKE ON NEW RESPONSIBILITIES AND ADJUST TO CHANGING TECHNOLOGY AND PRACTICES. MINES PROED OFFERS ACCESSIBLE AND INDUSTRY-FOCUSED TRAINING FOR STEM PROFESSIONALS AND THEIR TEAMS. WHETHER IMPROVING TECHNICAL EXPERTISE, PIVOTING INTO A NEW ROLE OR PREPARING A TEAM FOR EMERGING CHALLENGES, THIS NEW PLATFORM PROVIDES FLEXIBLE LEARNING THAT FITS BUSY SCHEDULES."

-Sam Spiegel, Assistant Vice President for Online Education

CHANGE AGENTS

Baker Hughes' chief sustainability officer is driving change in the energy industry and is betting on Mines students to help lead the way



Navigating big transitions—whether in your career or across an entire global industry—requires a bold vision, a steady hand and a deep understanding of what's at stake. Allyson Anderson Book brings all of that and more to her role as chief sustainability officer at Baker Hughes, where she leads the company's energy transition strategy. From advancing sustainable operations to developing policies that accelerate real-world solutions, she's helping reshape what the future of energy can look like.

Before joining Baker Hughes, Anderson Book was the executive director of the American Geosciences Institute and held several positions in academia, policy and government. While she's not a Mines graduate herself, she's a strong partner to the university, regularly collaborating with students, faculty and alumni to push the energy industry forward.

We sat down with Anderson Book to talk about what it takes to lead through change, particularly when stepping into a new role, and how Mines graduates can continue to position themselves at the forefront of the energy industry. Here's some of what she had to say.

***MINES MAGAZINE*: YOU JOINED BAKER HUGHES AS CHIEF SUSTAINABILITY OFFICER AT A CRITICAL TIME WHEN THE COMPANY WAS FIRST LOOKING TO SUPPORT A NET-ZERO STRATEGY ACROSS ITS OPERATIONS. HOW DO YOU NAVIGATE STEPPING INTO A NEW ROLE AND EFFECTIVELY LEADING CHANGE?**

Allyson Anderson Book: Throughout my career path, I've never shied away from trying new things. You've got to really have a growth mindset and be open to change. A lot of times, when people see change, they think it's scary—I've certainly thought that myself. And then they sometimes think the change is happening because of something they did. But, in fact, it usually has nothing to do with them. You have to make sure that people understand that when you're coming in and having the conversation that you're upfront and earnest and let them know that this is good for the organization to go in this direction.

MM: MANY MINES GRADUATES END UP WORKING IN THE ENERGY SECTOR, AT COMPANIES LIKE BAKER HUGHES. WHY

DO YOU THINK THEY ARE PARTICULARLY WELL-SUITED FOR THE INDUSTRY?

Anderson Book: I didn't go to Mines, but in another life, maybe I did because I'm a super fan. One area I've seen Mines doing really well is teaching more systems thinking, which is critical. There are other schools that have really strong engineering programs, but Mines is the best-kept secret. At Mines, people tend to go into an area with this really great breadth of knowledge that allows them to change a big machine or invent some other new way of running something in a really smart way. It all becomes very systems focused. This is why, when I think about investing in an academic partnership, I look to Mines.

MM: HOW DO YOU THINK MINES GRADUATES CAN TAKE ADVANTAGE OF OPPORTUNITIES IN A CONTINUALLY EVOLVING ENERGY INDUSTRY?

Anderson Book: Don't stay too fixed on a concept. As I look back on my career, I've never stayed fixed on one concept. As an undergrad, I thought I was going to go into environmental work. But on the bulletin board in the student lounge, there was a flyer for AAPG that had a $5 membership for students. I was like, hmm, it's five bucks, I should join that. Even though I was not into petroleum, I joined. Same with Geological Society of America. I kept an open mind, even though part of me didn't think it was in my DNA. I couldn't have been more wrong.

As a student at Mines, consider all extractive industries, because you're providing something that is essential to life on our planet. Without energy and without water, we're basically not going to have food at scale to support this hugely populated planet. Everything we do here leads to a better way of life, and I think that's really exciting. It's always motivated me. That's why I joined Baker Hughes. In every role I take, I want to have a bigger and bigger impact.

Imagine if this company becomes much more sustainable and we take those behaviors into the communities where we work. We can increase their way of life if they can turn on steady, affordable energy. GDP goes up. Quality of life goes up. They get better access to education, food. You're going to work for a company that has the ability to literally move markets and change the world. That is amazing.

Graduating undergraduate and graduate students are able to purchase a Mines Hat—a distinctive hat that serves as a symbol of Mines pride. Alumni, including **Becky Wall '94** and **David Camille '86**, volunteered at the Mines Hat branding and distribution event this spring ahead of Commencement and helped students brand their hat with university icons.

1970s

M. Stephen Enders '76 was appointed to Klondike Gold Corp.'s advisory board in February 2025.

1980s

Peggy Mott '86 was selected as the chief of dam safety for the Bureau of Reclamation in January 2025.

2000s

David Londoño MS '00 was appointed president and chief executive officer of Mineros S.A. in February 2025.

We're proud of Mines alumni. We want to cheer you on and celebrate your accomplishments. Tell us about your recent wedding, a new baby or your new job. Share a personal or professional accomplishment, volunteer activity or your favorite Mines memories. Stay connected to the Oredigger family.

→ Submit a class note at **minesmagazine.com/classnote**.

2010s

John Sherohman '12 and **Abigail (Dewsnap) Sherohman '12** welcomed their first child, Marigold Hannah, on January 9, 2025.

Caleb Courkamp '16, MS '17 and Aimee Babler were married on October 12, 2024, in Buena Vista, Colorado. Some Mines alumni were attendance, including groomsmen Shayne Justice '16 and Michael Harrison '16, who both played football with Caleb while at Mines.

Edward Wolfram '15 and Cassandra Wolfram welcomed Luke Hudson Wolfram in November 2024. He joins his siblings, Esther (6), Paul (4) and Peter (2).

2020s

Mines alumni **Robert Johanson '20, MS '21** and **Nicole Kowaliuk '21** were married on November 16, 2024, following a sweet proposal at their favorite place along Clear Creek. The couple met through the Mines Jazz Program and the rest is history.

Lucy Jane Kroh

Caleb Courkamp '16, MS '17 and Aimee Babler

Robert Johanson ’20, MS ’21
and Nicole Kowaliuk ’21

Marigold Hannah Sherohman

Mines alum added to the Colorado Business Hall of Fame

Charlie McNeil ’71 was inducted into the Colorado Business Hall of Fame in February 2025.
As part of a cohort of six other distinguished business leaders from past and present, McNeil joined a league of outstanding individuals who have made legendary contributions to the free enterprise system. Laureates were selected for their enduring and innovative professional contributions to Colorado, inspirational and ethical acumen and philanthropic endeavors.

McNeil is a successful entrepreneur with multiple company start-ups, including NexGen Resources Corporation, a natural resources company he founded and personally funded. He and his wife, Judy, have also been integral to the Mines Entrepreneurship and Innovation Ecosystem with a

transformational gift that enabled the creation of McNeil Hall and the McNeil Center for Entrepreneurship and Innovation on campus.

Additionally, Winfield Scott Stratton, the first millionaire of the Cripple Creek Gold Rush and namesake of the Stratton Commons on the Mines campus, was posthumously inducted into the Hall of Fame as part of the 2025 cohort.

Sydney Kramer

Paul, Esther, Luke and Peter Wolfram

Rebecca Mitchell '02, MS '07 appointed to Mines Board of Trustees

Rebecca Mitchell '02, MS '07 was appointed to the Mines Board of Trustees by Gov. Jared Polis in January 2025. Mitchell will serve a four-year term on the board through December 2028.

Mitchell is the State of Colorado's Commissioner to the Upper Colorado River Commission, representing the state's position in Colorado River interstate issues and negotiations on the operations of Lake Mead and Lake Powell.

An accomplished water leader with more than 20 years of experience in the water sector, Mitchell is highly knowledgeable in Colorado water law. She was also appointed director of the Inter-Basin Compact Committee (IBCC) in October 2023, strengthening and integrating water policy discussions happening across the state and the Colorado River Basin.

Previously, Mitchell was the director of the Colorado Water Conservation Board and played a significant role in developing the Colorado Water Plan, working with the state's nine basin roundtables, the Interbasin Compact Committee and the public. She has worked as a consulting engineer in both the public and private sectors.

→ Read *Mines Magazine's* former profile on Mitchell to learn more about her and her work on **minesmagazine.com.**

Joan Stratton '74 with Rhoda Kay '22 at the 2024 Homecoming 5K.

Joan V. Stratton '74 died December 10, 2024. Joan was born in 1951 and graduated from Mines with a Bachelor of Science in geology in 1974. She later obtained her medical degree from Dartmouth College and worked as an anesthesiologist at hospitals in Nevada for more than 30 years.

Joan was an accomplished athlete. She became the first woman to participate on the Mines Rifle Team and led a group of women on the team in 1972. Joan also participated in the track & field events, shotput and javelin, before Mines had a women's team. She set a precedent for other women to participate and compete in athletics at Mines. Joan continued to compete in shotput and javelin after graduation from Mines. Joan set an international athletic record as the U.S. national champion for athletes ages 35 and over, placing second for shotput in the XI World Veterans' Championship Games in Buffalo, New York in 1995.

Joan was a generous donor to Mines for generations and made a significant legacy gift through her estate. She served on the Board of Governors at Mines from 2019 to 2024, the Mines Century Society and the Geology Enhancement Committee. She supported Mines Athletics and created an endowed scholarship in memory of Civil Engineering Professor Henry A. Babcock.

Joan was a regular participant in Mines' Homecoming 5K, including in 2024 when she celebrated her 50th reunion and was a reunion committee member.

IN MEMORIAM

Remembering Orediggers who have passed away but will always remain part of the Mines community

Steven L. "Steve" Brown '77 died January 9, 2025. Steve was born in 1951 and started his career with ASARCO in Texas, where he was recognized for helping develop the Tuyère Silencer, which is now used around the world to increase the efficiency and safety of the production of copper. He later moved to Missouri and continued working with the company in various roles, including plant manager, until he retired.

Lawrence J. "Larry" Brumwell '71 died August 5, 2024. Born in 1949, Larry built a successful engineering career in Colorado, Illinois and Florida until 1988, when he transitioned to owning and managing Davidson Blueprinting in Lakeland, Florida. He continued in this role until his retirement in 2013.

Ronald R. "Ron" McDowell '87 died December 5, 2024. Ron was born in 1949 and spent several years working in computer programming and in gold exploration in Nova Scotia, Canada. He then spent most of his career as a research geologist with the West Virginia Geological and Economic Survey.

Richard Richards '62 died December 15, 2024. Born in 1935, Richard joined the U.S. Marine Corps before earning a Mines degree and beginning his geological engineering career with Dames & Moore. He became a partner at the firm at age 38 and later worked in corporate consulting as president of Ertec Rocky Mountain, F.M. Fox & Associates, Western Technology Consultants and Velzy & Associates. He was also a member of several professional societies and served on the Mines Alumni Board from 1992 to 1996.

James R. "Jim" Sanchez '64 died February 14, 2024. Jim served as 1st Lieutenant in the U.S. Army Ordinance Corps during the Vietnam War. He spent his professional career as a chemical process engineer for Engineering, Procurement and Construction (EPC) firms and a process and manufacturing engineer for environmental equipment firms. He also worked as a civil engineer, land surveyor and chemical engineer for civil consulting firms and their clients in the eastern U.S. and South America.

Allen R. Spelman '57 died November 9, 2024. Born in 1934, Allen's professional career spanned 28 years with Texaco.

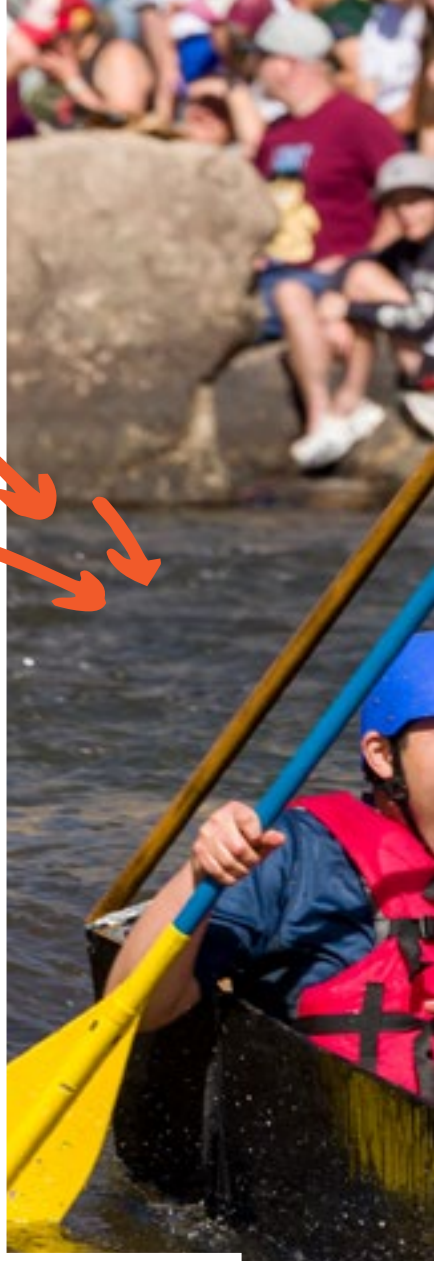
- To submit an obituary for publication in *Mines Magazine*, visit **minesmagazine.com/obituary**.
- Memorial gifts to the Colorado School of Mines Foundation are a meaningful way to honor the legacy of friends and colleagues while communicating your support to survivors. For more information, call **303-273-3275** or visit **weare.mines.edu/givingguide**.

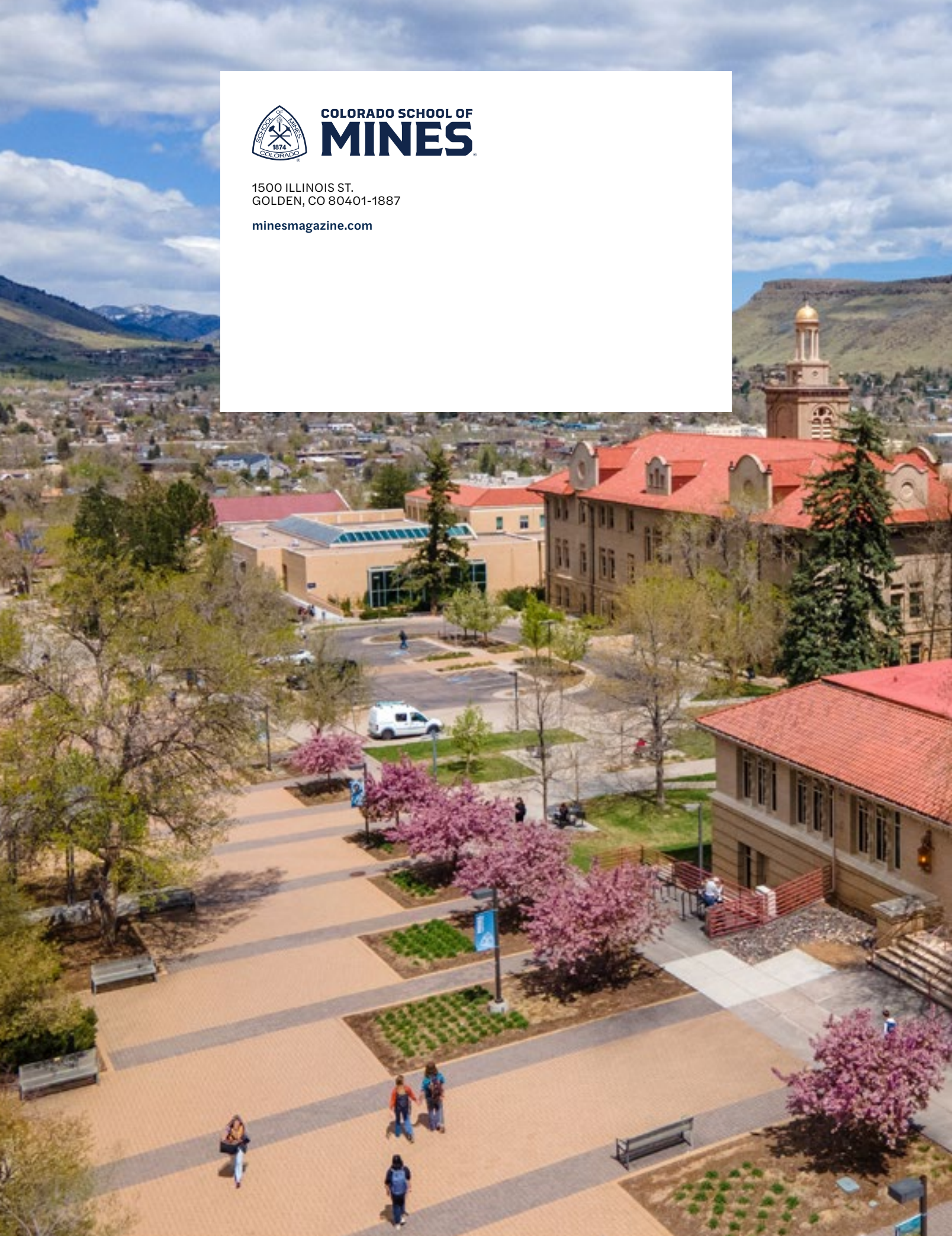
BUILT FROM TRADITION, FUELED BY FUN

Reliving moments from 2025 E-Days

This year's E-Days was a high-energy celebration of Oredigger pride, blending tradition, innovation and plenty of fun. Of course, the weekend kicked off with the classic Ore Cart Pull to downtown Denver and Golden showcased the iconic and crowd-favorite cardboard boat race. Throughout the weekend, the concerts, comedy shows, field day events and mining games capped off with an impressive fireworks display all kept campus buzzing, highlighting the strong sense of community and unstoppable spirit that makes Mines special. E-Days isn't just a break from the books—it's a showcase of what makes Orediggers proud to be part of something bigger, year after year.

E-DAYS ISN'T JUST A BREAK FROM THE BOOKS—IT'S A SHOWCASE OF WHAT MAKES OREDIGGERS PROUD TO BE PART OF SOMETHING BIGGER, YEAR AFTER YEAR.





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