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The Bridge Newsletter Winter 2022

Missouri University of Science and Technology

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THE BRIDGE

Missouri S&T
Winter 2022 | Vol. 49

Civil, Architectural and Environmental Engineering

Turning CO₂ into rock
Combating climate change
page 4

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FROM THE CHAIR: Joel G. Burken, Ph.D., P.E., BCEE, F.AEESP



As 2022 draws to a close, we look back on the year that was with great pride of accomplishment ... and also with a bit of exhaustion. A great amount of hard work went into remarkable accomplishments from our faculty, students and alumni, both in the classroom and well beyond.

Dr. Hongyan Ma is making quite an impact ... or should I say mitigating impact? His work to de-carbonize concrete production (page 4 and the cover photo) is central to two new large projects at S&T that include faculty and students from several departments. The sustainability topics are prominent in other new projects, such as Ph.D. student **Radwa Eissa** and advisor **Dr. Islam El-adaway**, who are investigating ways to incorporate circular principles into construction (page 5) to improve infrastructure project sustainability and resilience. Overall, we have seen a notable increase in new projects and novel research. Externally funded research awards to department faculty topped \$6M for the FY 2022 year (page 3), and our publications-per-faculty member has also increased, now topping eight published articles per year on average. With the recent surge in new projects this fall, we anticipate increased growth in the new year!

Our educational programs were also celebrated as “degrees of the future” for advancing in renewable energy integration (page 6) as we’ve developed new educational opportunities in infrastructure resilience and sustainability. We continue to look to advance

our online educational programs, and *U.S. News* recognized S&T as a top-10 university for online engineering overall, ranking No. 9 internationally (page 3). S&T has always had a premium on quality education. The quality of our graduates is also well recognized. At the fall Career Fair, we had over 240 companies looking to hire our civil, architectural, and environmental engineers, with demand surpassing our supply. We are scheduled to confer another 106 engineering degrees at the December commencements, and the S&T civil program is ranked in the top 30 largest programs nationally.

We also celebrate accomplishments outside the classroom and labs, including faculty leadership in international service and with student competition teams and organizations like Engineers Without Borders returning to more activities. In the first year back, our engineering design competition team also excelled, including a great showing from the Steel Bridge Team at the international competition at Virginia Tech with a 13th-place finish internationally. **Dr. Dan Oerther** was appointed to chair the board of trustees of the Chartered Institute of Environmental Health (page 11), centered in the U.K., and will be in that international leadership role starting Jan. 1, 2023. And our faculty are not the only ones to be noted for exemplary service, as **Elizabeth Tarbox**, a master’s student in environmental engineering and captain in the U.S. Army, was named the Pat Tillman Scholar (page 10) for her military service and work on humanitarian missions to provide disaster relief.

The year 2022 is almost in the rear view for us all, and as I reflect back upon the tremendous effort and accomplishment of our CAEE team, I find it humbling and gratifying to see the strength and dedication to our motto of **Change the World!** Our Miners have continued to build on the legacy of doing exactly that for over 150 years ... Go Miners!

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DEPARTMENT ADMINISTRATION

Department Chair

Joel Burken, Ph.D., P.E., BCEE, F.AEESP

Assistant Chairs

Civil: Eric Showalter, Ph.D., P.E.

Architectural: Stuart Baur, Ph.D., A.I.A.

Environmental: Mark Fitch, Ph.D.

Graduate Programs: Jianmin Wang, Ph.D., P.E.

DATA & RANKINGS

\$6.3M New Awards
for 2022

Publications per faculty member

8.1/YEAR

Academic Ranking
of World Universities
Shanghai ranking

51-75

(Highest ranked Missouri Engineering Program)

U.S. NEWS RANKINGS

#9 ONLINE ENGINEERING GRADUATE PROGRAMS

#48 CIVIL ENGINEERING GRADUATE PROGRAM

ASEE RANKING
Nationally for number
of Civil Graduates

#27

95% Career Placement
Outcome Rate

AVERAGE REPORTED SALARY

\$63,306.22

25th Percentile	75th Percentile	Highest Salary
\$61,000	\$67,000	\$81,500

THE BRIDGE



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Missouri S&T student, **Radwa Eissa**, is studying ways to build structures that incorporate reusable, modular components and materials that could be recycled at the end of a building's useful life.

7 Ph.D. graduate wins Fellowship for solar farm protection research

Looking into new designs to help solar panels withstand severe weather threats is giving **Yi Zhao** the chance to expand his research in clean energy.

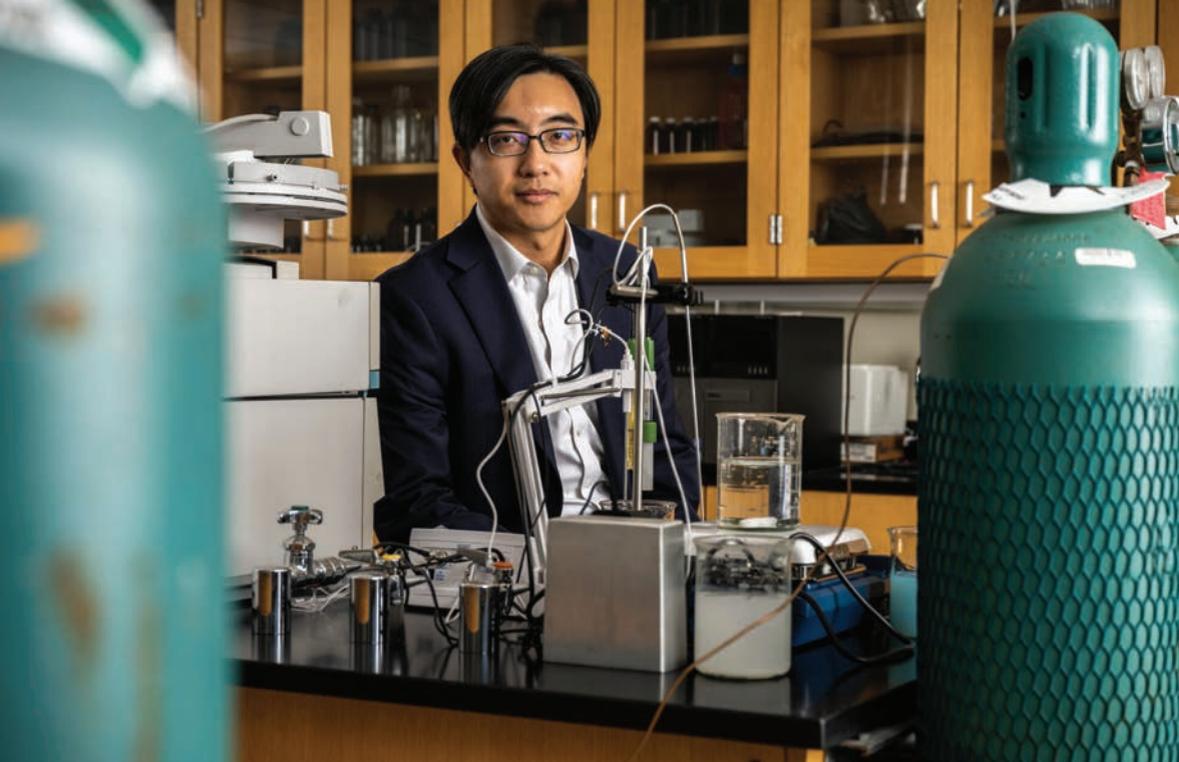
9 Rockne presents 2022 Mathes Lecture

This year's Mathes Lecturer discussed ways to evolve engineering education to help meet grand challenge sustainability goals.

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Dr. Hongyan Ma is developing technologies for CO₂ storage and production of carbon-negative cement materials for making concrete.

Photo by Michael Pierce, Missouri S&T

Missouri S&T CO₂ research is rock solid

by Nancy Bowles

As climate change accelerates, scientists are investigating ways to lower carbon dioxide in the atmosphere. At Missouri S&T, researchers are developing solutions by turning CO₂ into rock, including massive rocks for permanent carbon storage, and concrete, the manmade rock that supports modern civilization.

“CO₂ concentration in our atmosphere is now 420 parts per million, the highest in human history,” says **Dr. Hongyan Ma**, an associate professor of civil engineering at Missouri S&T. “We need ways to not only reduce CO₂ emission but also to remove CO₂ from the air and utilize or permanently store the removed CO₂ at a scale large enough to combat climate change.”

Ma and a team of researchers in materials science and engineering, chemical engineering, mining, economics, and other disciplines at Missouri S&T are forcing CO₂ to react with silicate rocks and industrial wastes generated from power plants, cement plants, concrete recycling facilities, and steel mills to form carbonate minerals. Such reactions happen in nature over millions of years to create natural limestone and dolomite formations that stores trillions of tons of carbon, but they are too slow to address the climate change challenge.

Ma and his team use innovative technologies to speed up the process. Their manmade rocks are intended for gigaton-scale permanent carbon storage or production of carbon-negative cement materials for making concrete. Traditional cement production emits a metric ton of CO₂ for every metric ton of cement produced, and Ma says the innovations will potentially reduce over 2 billion metric tons of CO₂ every year.

Ma’s CO₂ conversion and utilization work has garnered more than \$2 million in grants for Missouri S&T from the National Science Foundation and other organizations such as the Environmental Research & Education Foundation and the Association for Iron & Steel Technology. These research projects focus on processing various solid wastes using captured CO₂ or CO₂-rich flue gases to make carbon-negative cement materials and manmade rock for permanent carbon storage. Ma is seeking follow-up grant funding and investment to scale up these innovations and accelerate commercialization.

Bringing circular economy to construction projects

by Nancy Bowles

The circular economy is a production and consumption model that reduces material use, optimizes resources, and promotes recycling or reusing waste materials. It has played a role in packaging for years by encouraging recycling and keeping packaging materials out of landfills. Now, with support from the Kummer Innovation and Entrepreneurship Doctoral Fellow Program, a Missouri S&T student is looking to bring the concept to construction by studying ways to build structures that incorporate reusable, modular components and materials that could be recycled at the end of the building's useful life.

"There are design strategies that involve disassembly and reuse," says researcher **Radwa Eissa**, who is working toward a Ph.D. in civil engineering. "Buildings can be designed for two lifespans, first for one use and then for a different use. There are also strategies to extend the life cycle of the building itself."

Eissa says newer technologies such as 3D printing and blockchain can help establish the circular economy in construction by streamlining construction and certifying that sustainable materials are used. She says building information modeling (BIM) can help eliminate waste by managing data to create a digital model that represents a building's lifecycle, from the planning stages to the end of its useful life. Eissa is working on the project with her advisor, **Dr. Islam El-adaway**, the Hurst-McCarthy Professor of Civil Engineering at Missouri S&T.

"Radwa is a perfect fit for this timely and demanding project because of her outstanding technical, quantitative and qualitative skillset," says



Ph.D. student Radwa Eissa is studying ways to incorporate circular economy principles into construction. Photo by Michael Pierce, Missouri S&T

El-adaway. "She also represents the top-caliber students we recruit as Kummer I&E Doctoral Fellows. Advancing the concepts of circular economy aligns perfectly with the sustainability focus promoted by our Missouri Consortium for Construction Innovation (MO-CCI) and its member companies, both through research support as well as student development activities."

Eissa also wants to develop a metric to measure the circular economy. She says there are metrics in current literature, but no uniform measurement. The metric is important to show the transition to circular construction models and ultimately a more sustainable built environment.

"We can't have a circular economy while using extensive amounts of water and energy," Eissa says. "The transition has to include water and power efficiency in building construction and operation."

The Kummer I&E Fellows program is one of several new initiatives established through June and Fred Kummer's generous \$300 million gift. The program encourages inventive students to pursue doctoral degrees and strengthen applied research, technological innovation and economic development in the region, state and nation. The program is limited to 100 scholars each year and is open to domestic and international students.



Illustration: MarcoVector (Shutterstock)

Missouri S&T makes list of “degrees of the future” for energy engineering

Missouri S&T is one of 15 U.S. universities chosen by the science and technology website Gizmodo as schools that offer the best energy engineering programs in a recent “degrees of the future” report.

“One of the most critical problems humans currently have is how to generate power efficiently,” Gizmodo’s editors wrote in the report, which was released Aug. 11. “We have many ways of generating electric power, but all have their drawbacks – some are devastating for the environment, some are difficult to scale, and some have been sidelined for years due to fears about safety.

“As we move away from fossil fuels, energy engineering will help us find more efficient alternatives and better ways to use existing renewable energy like wind and solar,” the Gizmodo editors wrote. “The field produces innovations in energy production, storage, consumption, and distribution, and will hopefully free us from our destructive reliance on oil and gas.”

Missouri S&T is also the only university in Missouri to make the list. The energy engineering ranking was one of 25 “future-relevant” fields of study included in the report. To determine the best universities in each category, Gizmodo relied on independent surveys with faculty, alumni and students, statistical data published by the U.S. government, and data evaluating the impact of published scholarly papers by an institution in a particular field of study.

Civil engineering noted as top STEM profession

Civil engineering is No. 1! Architectural and environmental engineering are close behind.

In a recent *U.S. News & World Report* article, civil engineering was noted as the top STEM profession in the U.S., citing job satisfaction, upward career mobility and job opportunities.

“Civil engineers are involved in all parts of the built environment and in the protection and restoration of the natural environment,” says Maria Lehman, 2022-23 president of the American Society of Civil Engineers (ASCE).

Architects and environmental engineers also landed in the top six professions, showing that protecting human health and providing a better world to live in is important in career satisfaction and career opportunities.

Website: money.usnews.com/careers/best-jobs/rankings/best-engineering-jobs

Ignition Grants awarded

Dr. Nicolas A. Libre, associate teaching professor of structural engineering, and **Dr. Bonnie Bachman**, professor of economics, were among six research teams selected to receive Kummer Ignition Grants for Sustainable Educational Transformation to support new and innovative ideas that lead to transformations in education at Missouri S&T. Their project is titled “Promoting Entrepreneurial Mindset Learning in Mechanics of Materials.”



Missouri S&T Ph.D. graduate wins \$70,000 Laegeler Fellowship for solar farm protection research

Research into new designs to help solar panels withstand severe weather threats landed a \$70,000 fellowship for **Yi Zhao**, (pictured below) who earned a Ph.D. from Missouri S&T this spring. The Laegeler Sustainable Energy Fellowship – from Concept to Reality was created by two Missouri S&T graduates and will provide a stipend and benefits for Zhao to conduct postdoctoral research at S&T.



Zhao points out that 22 weather-related disasters in 2021 each caused a billion dollars in damage, compared with three in 1980. Forecasters predict that extreme weather events will continue to increase because of climate change. Zhao says he became interested in protecting solar farms to combat climate change through clean energy.

“I’m working on new designs to make solar panels more weather resistant,” says Zhao. “This fellowship supports the beginning of my career and gives me the chance to expand my research in clean energy. I believe this will provide precious experience, starting with the research idea and moving into production.”

Zhao is researching three autonomous technologies: sacking, fencing and shelter. The sacking system lays solar panels flat on the ground to reduce wind pressure in strong winds or tornadoes. The system can also improve the panels’ productivity during normal operations by adjusting their orientation to increase direct exposure to sunlight. Zhao says the adjustment may increase productivity by up to 25% compared with traditional fixed panels.

The fencing system, installed around the perimeter of a solar farm, would automatically and adaptively change the fence height depending on severe-weather characteristics. The autonomous tornado shelter would lower solar panels below ground and cover them. The solar farm size, location and other factors would determine which system would be used.

Zhao is working with **Dr. Grace Yan**, associate professor of civil, architectural and environmental engineering at Missouri S&T, to improve solar panels’ survivability in tornadoes and other weather events. Yan has formed an interdisciplinary team that plans to apply for funding from the U.S. Department of Energy. Zhao believes the research opportunities supported by the Laegeler fellowship will give the team the preliminary results they need for future projects and research.

The Laegeler Fellowship was established in 2020 by Missouri S&T alumni **Molly**, PetE’00, and **Andy**, Chem’01, BSci’01, **Laegeler**. They created the fellowship because they feel strongly that additional research will identify technologies able to bring profitable, sustainable energy to the world.

Molly Laegeler is a member of the S&T Academy of Mines and Metallurgy and serves as a vice president of Chevron Corp. in Bakersfield, California. Andy Laegeler played on the S&T men’s golf team. He is a hospital pharmacy consultant and USA Swimming, USA Triathlon and Ironman Certified Coach.

Giving back without giving up



Gary White, CE'85, MS CE'87, co-founder and CEO of two companies: Water.org, an American nonprofit developmental aid organization, and WaterEquity, an asset management firm working to end the global water and climate crisis, answered some important questions in an article titled "Giving back without giving up" in the July/August 2022 issue of *Civil Engineering*. He gave great advice on ways civil engineers can give back to their communities by identifying social justice problems and developing solutions — just as he and his business partner, actor and Academy Award winner Matt Damon, are doing. The pair also shared their successes, failures, and ongoing efforts to solve the global clean water and sanitation access crisis in their recent book, *The Worth of Water*.

Website: www.asce.org/publications-and-news/civil-engineering-source/civil-engineering-magazine/issues/magazine-issue/article/2022/07/giving-back-without-giving-up.

CENTER FOR RESEARCH IN ENERGY & ENVIRONMENT (CREE)

A vision of our energy and environmental policy future



The Center for Research in Energy and Environment (CREE) hosted a seminar by Roger Walker, executive director of the Regulatory Environmental Group for Missouri (REGFORM), in September. His talk was titled "Harsh Political Pendulum Swings: A Survival Guide."

Increasingly challenging pendulum swings in energy and environmental policy over the past two decades have become the norm. Distrust, misinformation, and partisan politics have harmed the ability to reach consensus, trust scientific research, govern effectively, and solve critical problems. This seminar addressed how we reached this point, discussed key regulatory policy trends and offered a vision of our energy and environmental policy future.

Learning about human behavior and climate change



Dr. Louis J. Gross, whose research focuses on computational and mathematical ecology, visited Missouri S&T and shared his cross-disciplinary perspective on climate change. His lecture, "A Rational Basis for Hope: Human Behavior and Climate Change," was intended for a general audience and drew on Gross' recent work, including a paper published earlier this year in the multidisciplinary science journal *Nature*.

Gross is the co-editor of the *Encyclopedia of Theoretical Ecology* and principal investigator of more than \$50 million in research funding. Gross is a Chancellor's Professor emeritus and emeritus Distinguished Professor of Ecology and Evolutionary Biology and Mathematics at the University of Tennessee, where he has taught since 1979.

Learn more: CREE.MST.EDU

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Rockne presents Mathes Lecture on ways to evolve engineering education



Two National Academy of Engineering studies indicated that sustainable solutions could help solve what it calls grand challenges to engineering. Dr. Karl Rockne, associate dean for research in the University of Illinois-Chicago's College of Engineering, discussed ways to evolve engineering education to help meet these sustainability goals during this year's Mathes Lecture.

Rockne has been an environmental engineering researcher for three decades. In addition to his main research focus on contaminated sediments, his interests span fields as diverse as the biodeterioration of dental materials to working with Midwestern farmers to mitigate nutrient pollution by using wetlands. He was a pioneer of "active capping" technology and one of the world's leading researchers in the understanding of "gas ebullition," the process of biogenic gas production in sediments. The unifying theme of his research is that complex environmental problems require a deep integration of biology, chemistry and physics to explain underlying mechanisms and develop effective and cost-feasible solutions.

Rockne earned bachelor's and master's degrees in civil engineering from the University of Minnesota and a Ph.D. in environmental engineering from the University of Washington. He was a postdoctoral researcher in the chemical engineering department at Rutgers University.

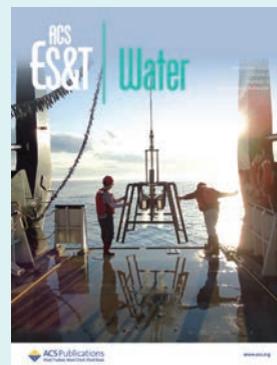
The Mathes Distinguished Lecture is made possible through gifts from **John Mathes**, CE'67, MS CE'68, and his wife, Susan. The couple established the university's first endowed faculty position under a program that matched state funding with private gifts. In 2006, they made an additional gift to elevate that professorship to the Mathes Chair in Environmental Engineering.



Above: Grateful to have John Mathes, CE'67, MS CE'68, back to campus for the Mathes Lecture.

Right: Dr. Karl Rockne (left) and An Li (right), wrap up a five-year sampling campaign on the Great Lakes in this cover shot.

Image provided by Karl Rockne.



S&T GRADUATE STUDENT EARNS PAT TILLMAN SCHOLARSHIP

posted by Peter Ehrhard

Elizabeth Tarbox, a graduate student in environmental engineering at Missouri S&T from Springfield, Missouri, has been named a Pat Tillman Foundation Scholar in recognition of her military service and work on humanitarian missions to provide disaster relief.

Tillman Scholars are U.S. service members, veterans and military spouses chosen based on their service, leadership and potential. Of more than 2,000 applicants, only 60 are named each year. Tillman Scholars are awarded academic scholarships, lifelong leadership development opportunities and a diverse, global community of high-performing mentors and peers.

Tarbox is a captain in the U.S. Army Corps of Engineers at Fort Leonard Wood.

“My family really enjoys watching football, and I was aware of the Tillman foundation and his story and sacrifice for a long time,” says Tarbox. “I started looking into the scholarship and organization more as I applied for S&T. I never believed I would have a chance at being selected for such a competitive scholarship; however, I have always



Elizabeth Tarbox
Photo from the Pat Tillman Foundation website

lived with the mentality to go for the long shot.”

Tarbox is a published research author and contributor to peer-reviewed journals within the scientific community and is an inventor of patented low-power ultrasound technology. During her Engineer Captains Career Course, she graduated on the commandant’s list and was the Society of American Military Engineers award winner.

“I think working full time and taking graduate courses demands knowledge

on realistically managing time,” says Tarbox. “Often people will either underprepare their schedule or, as I did in the past, will overbook themselves. Half of the struggle is learning ‘what works’ for your own rhythm. Overall, like anything challenging, it requires discipline.”

Tarbox says that her desire to serve her country began after hearing stories of her grandfather’s service as an amphibious sapper (combat engineer) during WWII. During her undergraduate studies, she simultaneously studied engineering, participated in ROTC, volunteered as an EMT and worked as a researcher.

“I hope to apply my biomedical engineering training in combination with environmental engineering and geospatial sciences to tackle humanitarian assistance, disaster relief, and human trafficking problems,” says Tarbox. “From clean water to satellites in space, engineers shape the world and pave the future. As an engineer, I hope to solve challenges and create a better tomorrow.”

U.S. ARMY LEADERS VISIT CAMPUS

Dr. Grace Yan, associate professor of structural engineering, hosted U.S. Army Engineer Research and Development Center leaders at Missouri S&T for a discussion about potential collaboration on the project: “Digital-Twins for Resilience: Transforming and Harvesting Resilience through Integrated Vigorous Engineering (THRIVE).” Dr. Ty Wamsley, director of the Coastal and Hydraulics Laboratory with the U.S. Army Engineer Research and Development Center, discussed research needs and opportunities of the Coastal and Hydraulics Lab.



Chartered Institute of Environmental Health



www.cieh.org

Oerther appointed Chair of CIEH Board of Trustees

Chartered Institute of Environmental Health is delighted to announce the appointment of **Dr. Daniel Oerther** as the new chair of the Board of Trustees. He will take over from Terenja Humphries when her term comes to a close in December.

A Fellow of CIEH for five years, Oerther is a professor of environmental health engineering at Missouri S&T. Before being elected board chair, he served as deputy chair of the Board of Trustees.

Bringing a wealth of experience in environmental health practice internationally, Oerther has built a global reputation for advocating science and technology as a practical solution to promote human health and to protect the environment for future generations.

Using innovation to solve complex environmental challenges has always been a major theme in Oerther's projects. Beyond promoting sustainable fishing and agricultural practices for nutrition security, he also works to promote access to water, sanitation, and hygiene.

Oerther's commitment to global environmental health was showcased by his work to improve conditions for infants and mothers in the indigenous

Ladino population in the Western Highlands of Guatemala. His project, using data analytics to assess the effectiveness of water and food safety interventions to prevent childhood stunting, saw him recognized with a CIEH Excellence Award in 2018 for Best Innovative Environmental Health Solution.

He is also passionate about promoting environmental stewardship in disadvantaged communities and highlighting the role environmental health professionals have in making all communities healthier and safer. This drive to nurture culturally diverse and inclusive environments has seen him partner and work closely with university researchers in London, community health nurses in Hull, and civil engineers in Newcastle.

Along with a recognition of the high standards and value of environmental health professionals in the U.K., Oerther's work across the Commonwealth led him to seek professional recognition in this country, where he is a Fellow of the Royal Society for Public Health and a Fellow of the Society of Operations Engineers. Oerther is a Chartered Engineer (CEng) and a Chartered Environmentalist (CEnv). In 2019, he was recognized as a Fulbright Visiting Scholar to the School of Population Health and Environmental Sciences at King's College London.

In Missouri, Oerther practices as a Certified Environmental Health Specialist (similar to an Environmental Health Officer), and he was appointed by the Governor and confirmed by

the Senate as a Commissioner on the Missouri Hazardous Waste Management Commission. He is also a Diplomat of the American Academy of Sanitarians, a lifetime Honorary Fellow of the American Academy of Nursing, and he is the immediate Past President of the American Academy of Environmental Engineers and Scientists.

Oerther will officially take up his new role on Jan. 1, 2023.

"Today, the world faces the challenge of a changing climate where environmental health professionals must balance human safety with planetary survival. I joined CIEH to learn from and contribute to the best of the best in local practice while maintaining a global outlook. The unique contributions of environmental health officers must be amplified. Awareness of our work must reverberate from the walls of the homes we visit and the kitchens we inspect to the halls of Parliament, across the Atlantic, and around the globe," says Oerther.

"We are delighted that Oerther will be taking the vital role of chair of our board. His commitment to environmental health, and enthusiasm for new and innovative solutions is infectious, and I know he will bring invaluable energy right to the top of our organization. His rich and varied experience across the world will be a valuable asset to CIEH," said Dr. Phil James, Chief Executive of CIEH.

Terry selected to park's team



Ozark National Scenic Riverways Superintendent Jason Lott announced the selection of **William Terry**, CE'08, MS CE'15, as the chief of facility management of the park's management team.

Terry comes to the NPS from the U.S. Army Corps of Engineers, where he was highly regarded as the Chief of the Water Resources Section for the Nashville District. In this capacity he managed a team primarily involved in conducting flood risk management studies, water supply planning and development, dam safety risk assessments, and ecosystem restoration projects within the Cumberland and Tennessee River Basins. He is a licensed professional engineer.

Terry grew up along the upper Current River, in the Jadwin community, and is the son of Bill Terry, a legendary Park Ranger for Ozark Riverways. He knows the rivers firsthand and is excited to enhance the visitor experience through his understanding of the needs of the floater, boater, hiker, camper, fisherman, and hunter; all activities which he enjoys doing along the Current and Jacks Fork rivers.



Alumnae host leadership event

Amy Strauss, CE'90, MS CE'91, **LaWanda Jones**, CE'91, and other women leaders in the Academy of Civil Engineers led a networking and leadership workshop at Butler-Carlton Civil Engineering Hall on Nov. 16. The 14 alumnae speakers conducted panels on topics ranging from challenges in the workplace and the benefits of professional service in career advancement to advancing diversity, equity, and inclusion in the profession. More than 80 students registered for the event, making it one of the biggest since the first event was held six years ago.

Construction award

Mark Cook, CE'83, and his construction inspection team at Jacobs Engineering, received a Florida Transportation Builders Association 2022 Best in Construction Award for the completion of the new SR-589 Suncoast Parkway 2 project in Citrus County, Florida. The project, which was completed with The Lane Construction Corp., was a \$150M, 13-mile new project with 15 bridges and two mainline tolling facilities. It took four years to complete.



Oerther named editor of wiki journal



Dr. Daniel B. Oerther, professor of environmental health engineering, was appointed editor of the *WikiJournal of Medicine*. First published in 2014 through Wikiversity, the *WikiJournal of Medicine* provides free access to peer-reviewed articles in medicine and biomedicine. Hosted by the Wikimedia Foundation, the same organization that runs Wikipedia, articles are published as citable, indexed PDFs, and suitable content is integrated into Wikipedia and related projects. The *WikiJournal of Medicine* is indexed by Scopus, Crossref, AltMetric and other databases.

ANNIVERSARY CELEBRATIONS



KCI Construction: Celebrating a century in business

In September, St. Louis-based KCI Construction celebrated 100 years in business. The firm began in 1922, founded by Charles Kloster as a carpentry construction company known as Kloster Co. They built schools, churches and single-family homes in the early days and evolved into hospital construction and then predominantly infrastructure work. In 1995 when the last of the Kloster namesakes left the business, the company's name became KCI Construction. The firm focuses on Missouri work. Its three biggest markets are transportation infrastructure, civil engineering and water/wastewater construction. Visit their website for more information (www.kciconstruction.com).



ARCO celebrates 30 years of excellence

In July, ARCO Construction celebrated its 30th anniversary. **Dick Arnoldy**, CE'69, MS CE'73, and **Jeff Cook**, MS EMgt'94, founded ARCO on the basic principle that the construction process should be enjoyable for customers and associates. Since, ARCO has seen tremendous success, growing from a single office in St. Louis, Mo. to a multi-billion-dollar enterprise. From successfully completing their first year of business to beginning construction on the largest project in ARCO history and everything in-between, these two Miner alumni are proud of every milestone they have achieved along the way.

Check out the article, 30 Milestones in 30 Years, for a look back at ARCO's three decades of excellence.

www.arconational.com/30-milestones-in-30-years

Everyone Can Do Something Highway Safety Advocates and Experts Join Together Toward Progress

By Robert Brinkmann, CE'71, Chairman
Missouri Highways and Transportation Commission
and the Missouri Coalition for Roadway Safety



Education, enforcement, engineering and emergency response – these focus areas drew in hundreds of safety advocates across the state for Missouri's Highway Safety and Traffic Conference, held recently in Columbia.

The conference and its focus areas exist to support our strategic highway safety plan, Show-Me Zero, which aims to eliminate fatalities and serious injuries on our roadways. This multi-disciplined approach, including the annual gathering of safety advocates and pioneers, reinforces a simple idea: no one can do everything, but everyone can do something.

Experts from across the state and country echoed this sentiment at the conference with powerful personal stories, promising engineering advancements, and innovative education and enforcement practices. The University of Alabama's Dr. Bharat Balasubramanian spoke to the more than 400 people in attendance about the emerging trends in vehicle technologies and how they might impact travel for better or worse. Cara Filler rounded out the three-day conference with an inspiring story of loss-turned-motivation, pushing attendees to continue in their efforts to save lives.

Eleven individuals and organizations were also recognized at the event for their work in highway safety. Among the honorees was the Kansas City Police Department's DUI Unit, which ranks top in the state and among the top in the country with 1,271 arrests in 2021.

A safer Missouri is a better Missouri. This conference is only a small piece of a larger effort. Changing the landscape of traffic fatalities in Missouri requires contributions across the board, from statewide agencies to private businesses and every individual who uses the transportation system. We encourage everyone to join our movement toward zero fatalities, because 'everyone can do something.'

For more information on ways to get involved, view our strategic highway safety plan, Show-Me Zero, Missouri Department of Transportation (savemolives.com), and help drive Missouri toward safer roads.

Pickerill on track to lead national association



Dr. Heath Pickerill, assistant teaching professor in civil, architectural and environmental engineering and director of Missouri's Local Technical Assistant Program (LTAP), was elected to the president's track of the National Local Technical Assistance Program Association

(NLTAPA) at the group's annual conference held recently in Seattle.

The organization works closely with the Federal Highway Administration, which provides funding to LTAP centers in each state and Puerto Rico.

Pickerill serves as vice president of the association. During this tenure through July 2023, he will serve as co-chair of the partnership workgroup to maintain and cultivate strong working relationships with organizations such as the American Public Works Association and Association of State Highway Transportation Officials. He will become president-elect in July 2023 and lead planning the 2024 NLTAPA Conference.

S&T hosts second annual critical minerals workshop

The future of cell phones, solar panels and electric vehicles depends on materials like cobalt, germanium and rare earth elements. Those and other critical minerals were the focus of the second annual virtual workshop hosted by Missouri S&T in August. The workshop was part S&T's critical-minerals workshop series funded by the National Science Foundation. It featured U.S. and international experts on subjects including mineral deposits, critical mineral sustainability, public policy, and processing and recycling.

Presentations addressed several topics, including workforce development, global supply chains, domestic mineral exploration, sourcing and production, governance, and sustainability. Participants had the opportunity to ask questions and further discuss the topics with the speakers. **Dr. Mark Fitch**, assistant chair and associate professor of civil, environmental and architectural engineering, helped with organizing the workshop.

Learn more: news.mst.edu/2022/06/missouri-st-hosts-second-annual-critical-minerals-workshop



Celebrating Extension and Engagement Week 2022

Missouri S&T celebrated Extension and Engagement Week 2022 with the University of Missouri System. This year's theme was "All Things Food."

All four UM System campuses showcased their resources, expertise and perspectives they bring to the table to work toward a shared vision of an improved food system.

Dr. Daniel Oerther, professor of environmental health engineering at Missouri S&T, participated in a panel discussion titled "Food, Health and Environment." Oerther is an expert in community health care systems and engineering, access to safe drinking water, nutrition security in Missouri, and effective hygiene in developing communities around the world.

Oerther and other panelists discussed the intersection of food, health and environment from a global perspective, as well as the importance of local extension activities. "Think global and act local" was the mantra at the intersection of the food we eat, the impact of food production on the environment and the role of food in promoting health and wellness.

Oerther elected chair of hazardous waste management commission

Dr. Daniel B. Oerther, professor of environmental health engineering, was elected chair of the Missouri Hazardous Waste Management Commission during its September meeting.



Founded in 1977, the commission implements and enforces the Missouri Hazardous Waste Management Law, which includes holding hearings on rules, complaints and permit appeals. The commission also promotes hazardous waste recycling, reuse

and reduction. The Missouri Department of Natural Resources assists the commission.

In 2020, Oerther was appointed to the commission by Gov. Michael Parson and he was confirmed by the Missouri State Senate with the sponsorship of Senator Justin Brown.



THIRTY & THRIVING

JE Dunn Construction held a special celebration for its clients, partners and friends at the Portland Art Museum to celebrate 30 years of building in the Northwest market. The evening was marked with renewed connections and reflecting on the past as they look towards the future.



ST. LOUIS SECTION EVENT



In September, the American Society of Civil Engineers (ASCE) St. Louis Section gathered for its annual dinner to recognize student scholarship winners and the achievements of section members. The event was held at the International Photography Hall of Fame. More than

65 people were in attendance for the dinner and ten students received scholarships.

Awards for professional Recognition and Younger Member of the Year were awarded, along with Project of the Year which was the Timber Trail to Briar Ridge Channel in Frontenac, Mo. Marsia Geldert-Murphey, 2022/23 Society President-Elect, installed the 2022/23 Board of Direction.

Those from Missouri S&T receiving awards were:

MISSOURI S&T STUDENT SCHOLARSHIP
Brendan Schmidt, CE'22

FACULTY ADVISOR OF THE YEAR
Dr. Joel Burken, PhD, PE, BCEE, F. AEESP

YOUNGER MEMBERS COMMITTEE



Brenan Pool, a senior in architectural and civil engineering, was selected to serve on The American Society of Civil Engineers' (ASCE) Committee on Younger Members for a three-year term.

ASCE Guest Speakers

ST. FRANCIS DAM FAILURE



Dr. J. David Rogers, the Karl F. Hasselmann Missouri Chair in Geological Engineering at S&T, was a guest speaker at the October ASCE Missouri S&T meeting. Rogers talked about his forensic studies on the St. Francis Dam failure in the 1990s. His penchant for recognizing prehistoric landslide features led him to undertake evaluations of geohazards in North and South America, Africa, Australia, and Central and Southwestern Asia.

POWERING THE JOURNEY



Dane Shaw, CE'11, MS CE'13, returned to campus as a featured speaker at the ASCE Missouri S&T student chapter meeting held in late August. His presentation was titled, "Powering the Journey." After graduating from S&T, Shaw worked as a structural engineer and certified bridge and tunnel inspector for five years at Jacobs Engineering. After a short stay with McClure Engineering, he joined Ameren Missouri in the spring of 2018 as a structural engineer in their dam safety, hydro and civil engineering program. In his role, Shaw supported facility upgrades as well as green energy projects including wind and solar installations. Since joining Ameren, he has been promoted to a project manager now supporting execution of Ameren's smart energy plan with a portfolio of projects across the State of Missouri.

HOBOLT ROAD EXTENSION PROJECT

Jon Kuchem, CE'18, MS CE'19, was a featured speaker at the September ASCE Missouri S&T student chapter meeting. He was joined by teammate **Abbey Harashe**, CE'20, to talk about Burns & McDonnell's Houbolt Road Extension project.





Straatmann named to D2CCA All-Super Region 3 team

by John Kean, athletic communications director

Missouri S&T linebacker **Ben Straatmann**, the Great Lakes Valley Conference's Defensive Player of the Year for the recently completed 2022 season, was named to the Division II Conference Commissioners Association (D2CCA) all-region team for Super Region 3. He is majoring in civil engineering

Straatmann led the Miners in tackles with 80, including 44 solo stops, eight quarterback sacks and 20 tackles for a loss as he became the first S&T player to have two seasons with at least 20 tackles behind the line of scrimmage. He has led the GLVC in both sacks and tackles for a loss in each of the last two seasons.

Straatmann, who also returned a fumble for a touchdown this season, was named to the All-GLVC first team for the second straight year and was one of five players league-wide that was a unanimous selection to the squad.

Ply lands all-region status

Missouri S&T middle hitter **Shelby Ply** was named to a second all-region team for the 2022 season, as she was named honorable mention on the American Volleyball Coaches Association's All-Midwest Region squad.



Ply, a senior in environmental engineering, was among eight players from Great Lakes Valley Conference schools to be chosen to the AVCA's all-region squad, with five being named to the first team and two others along with her earning honorable mention status. She earned her post-season honors based on a season that saw her break one school record and rank among the GLVC leaders in three categories.

During the 2022 season, Ply ranked among the conference leaders in hitting percentage and blocks to earn her first-team All-GLVC honor.

Miners named to All-GLVC volleyball team

Three members of Missouri S&T's volleyball squad were named to the Great Lakes Valley Conference's all-conference team for the 2022 season.

Shelby Ply, who ranks among the conference leaders in hitting percentage and blocks, was selected to the first team and was also S&T's nominee from the volleyball team for the James R. Spalding Sportsmanship Award. The Miners also had a pair of second-team selections in outside hitter **Jordan Burton** and setter **Hannah Merjil**, a senior in civil engineering.

Ply, a middle hitter for S&T, recorded a .380 hitting percentage during the 2022 season with 206 kills and only 42 attack errors in 432 attempts while also leading the Miners with 102 blocks.

Burton lead the Miners with 283 kills on the season and recorded a .234 hitting percentage; she has recorded the Miners' highest kill total in a game with 21 against Davenport during the Midwest Regional Crossover. She has reached double figures in kills in 16 of S&T's 24 games this year.

Merjil currently ranks ninth in the GLVC with her average of 6.4 assists per set as she has recorded 567 on the year. Merjil, who is fourth in program history with 2,235 kills posted a season-high 44 assists in a five-set win over Drury and had four games with more than 40 assists on the year.

McCownGordon Construction promotes Vaeth to lead KC business unit

Chris Vaeth, CE'02, a seasoned leader at McCownGordon Construction with nearly 20 years of experience with the company, has been named senior vice president of the Kansas City region. In his new role, Vaeth will lead the company's Kansas City business unit, guiding everything from business development and construction services to strategic growth and overall operations for the region.

"Chris is a strategic and driven leader with extensive expertise in the market, not only in terms of his construction and financial knowledge, but also his understanding of the broader marketplace, future opportunities, and what our clients in K.C. are looking for from a construction management partner," said Ramin Cherafat, CEO of the company. "Chris builds strong client relationships and excels at developing successful teams. We're excited for our future in the K.C. region and know Chris will help McCownGordon continue to grow."



Chris Vaeth

In his new role, Vaeth, along with others, will lead the company's regional work in the area, including overseeing the corporate and developer projects, as well as civic, K-12, higher education, healthcare, and science and technology markets across the metro and in nearby Kansas and Missouri locations, as well as the leading the teams in South Dakota and Arkansas. He also serves on the company's executive leadership team.

Vaeth joined McCownGordon in 2003 after spending a short stint at another national contractor. In his time with McCownGordon, he's worked in numerous vertical markets and at one time led the firm's preconstruction services team.

"I'm excited to make a larger impact on our work," said Vaeth. "My passions are solving challenges and building robust teams that deliver for our clients, knowing that investing in a building is a significant decision for any organization, and owners need a team that keeps their best interests front and center."

Previously, Vaeth held several high-level roles with McCownGordon, including serving as vice president of the K.C. market and prior to that, vice president of preconstruction services.

STV Inc. names Ploch vice president and director of program management

Eric Ploch, CE'88, MS CE'97, was named vice president and director of program management for STV Incorporated — a leader in engineering, architectural, planning and program and construction management services — in their Austin, Texas, office.

Ploch is a seasoned professional with more than 30 years of experience in transportation design, planning and program management. He previously served as a senior program manager and principal-in-charge of critical General Engineering Consultant (GEC) contracts and project management consulting projects throughout Texas.

Ploch has also provided leadership and advisory services to major

transportation clients such as the Central Texas Regional Mobility Authority (CTRMA), TxDOT and the Missouri Department of Transportation.

He is heavily involved in the Austin community and has served as principal-in-charge for transit and regional mobility assignments with the Capital Metropolitan Transportation Authority (CapMetro), the City of Austin, and the TxDOT Austin District.

As director of program management, Ploch will focus on enhancing the portfolio of program management services at STV and CP&Y and aligning market opportunities with capabilities.



Eric Ploch



STAFF AWARDS

Two of our staff members received awards at the College of Engineering and Computing Recognition Ceremony and Holiday Gathering. Pictured from left to right are **Jeff Heniff**, Rookie of the Year Award, **Jeannie Werner**, Extra Mile Award and **Dr. Joel Burken**, department chair.

TEWARI PROMOTED

Dr. Sanjay Tewari was promoted to associate teaching professor. Tewari teaches environmental and water resources engineering for our MSU Program in Springfield, Missouri.

FACULTY AWARDS



Three faculty members were recognized for their achievements and excellence in research, service and teaching.

Pictured from left to right with **Dr. Joel Burken**, chair of the department:

- **Dr. Sanjay Tewari**, Faculty Achievement Award, recognizes non-tenure-track faculty who have demonstrated sustained excellence in at least one of the categories of teaching, research, or service.
- **Dr. Daniel Oerther**, Experiential Learning Award, recognizes faculty who require undergraduate students to go beyond mastering basic skills and knowledge in the application of that material to problem-solving challenges.
- **Dr. Hongyan Ma**, Faculty Research Award, recognizes faculty members who have demonstrated excellence in research and scholarship.

Inaugural MO-CCI Industry night

Thank you to the following companies that attended our first MO-CCI Industry Night. We appreciate you taking time to talk with our students about job opportunities in the construction industry.

- Alberici Constructors
- ARCO Construction Co.
- BJC HealthCare
- Brinkmann Constructors
- Clayco
- Greensfelder, Hemker & Gale, P.C.
- McCarthy Building Companies, Inc.
- PARIC Corp.





EXPANDING YOUR HORIZONS

Miner alumna and engineering rockstar **Marsia Geldert-Murphey**, MS CE'97, was the keynote speaker for this year's Expanding Your Horizons Conference.

Expanding Your Horizons helps seventh- and eighth-grade girls learn about careers in science, technology, engineering and math fields, while providing them access to S&T facilities and inspirational students, faculty and staff. The EYH event brings 500 students to campus.

5 GREAT TIPS WHEN FRUSTRATED WITH WORK

Krista Porterfield Looney, CE'10, MS CE'12, offered some useful tips to combat work frustrations.

1. Remember, it's temporary
2. Get out of your head
3. Recognize the potential for growth
4. Pursue your own workflow
5. Remind yourself why your job matters.

Looney works for Wallace Design and has performed structural assessments, inspections and roof evaluations on structures across the United States.

Website: wallace.design/everything-is-not-awesome-all-the-time-5-tips-for-when-youre-frustrated-with-work



Ph.D. student wins second place in poster competition at Geo-Resolution Conference

The National Geospatial-Intelligence Agency (NGA) and Saint Louis University (SLU) co-sponsoring of the 2022 Geo-Resolution Conference recently provided a venue for collaboration between students and geospatial experts in government, academia and industry to lay a foundation for innovative solutions to mitigate the effect of climate changes. Led by SLU, Taylor Geospatial Institute (TGI) is a consortium of eight research institutions that share their expertise and critical research facilities. TGI organized a student poster competition at the annual symposium in September and received 40 posters from students with a wide range of research topics connected to geospatial science. **Pengfei Ma**, a Ph.D. student under the supervision of **Dr. Genda Chen**, represented the Center for Intelligent Infrastructure (CII) and INSPIRE University Transportation Center (UTC) at the competition. Pengfei has submitted two journal manuscripts for potential publications and is preparing two additional journal manuscripts for submission. All the submitted posters and their accompanying videos are available on the TGI website (taylorgeospatial.org/geo-resolution-2022-poster-session).

INSPIRE webinar on bridge inspection technologies

INSPIRE University Transportation Center hosted a webinar, titled "Reliability of Bridge Inspection Technologies" in September with University of Missouri-Columbia Professor **Dr. Glenn Washer** serving as the guest speaker.

Washer's presentation focused on the reliability of inspection technologies used for the condition assessment of highway bridges. Variability in several common NDE techniques was discussed, such as Ground Penetrating Radar (GPR), Infrared Thermography (IRT), and Ultrasonic Testing (UT), based on results from field studies and performance tests.

Learn more at: inspire-utc.mst.edu/webinars



Opening Week 2022

The group of Missouri S&T freshmen, pictured above, got a taste of the department by partaking in interactive lab demonstrations, trying out modeling software and crushing concrete during Opening Week activities.



Pictured from left to right: **Brett Kolb**, **Emily Howe**, **Maggie Merz** and **Matthew Bartosch**.

Chi Epsilon conference

Four Executive Board members attended the Chi Epsilon Central District Conference at Oklahoma State University in Stillwater, Oklahoma.



Making history

Aruna (Katragadda) Miller, CE'89, made history Tuesday, Nov. 8, when she was elected as the first immigrant and Indian-American woman to become lieutenant governor of Maryland. She was the running mate of Democrat Wes Moore, who became the first Black individual to win the governorship of Maryland.

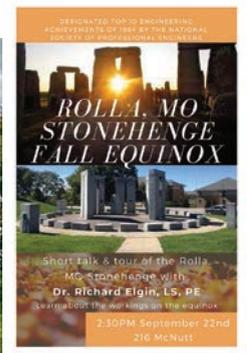
Miller was 7 when her family immigrated to the United States from Hyderabad, India. She grew up in New York and became a U.S. citizen in 2000. Aruna met her husband, **David Miller**, EE'89, at S&T.



Witushynsky recognized by ENR as top professional

Nichole Witushynsky, ArchE'08, MS CE'11, was recognized as one of ENR Midwest's 2023 Top Young Professionals for her exceptional career. Twenty individuals under the age of 40 were selected based on their talent, leadership and service in the AEC industry.

Nichole is a senior engineer at WSP USA and is an awesome role model and supporter of our Miners.



Missouri S&T Equinox and Wellness Fair

This year's equinox event showcased campus organizations that help students succeed, such as the "Student Oasis," wellness, intramural sports and student success. **Dr. Richard "Dick" Elgin, CE'74, MS CE'76**, gave a great presentation on the equinox and the calculations and science that went into S&T's Stonehenge. The work of Drs. Joseph Senne and David Summers is certainly a landmark for Missouri S&T and Rolla, Missouri.

JOB SATISFACTION



★★★★★

85.2% OF RESPONDENTS SAID THEY WERE EITHER SATISFIED OR VERY SATISFIED WITH THEIR WORK

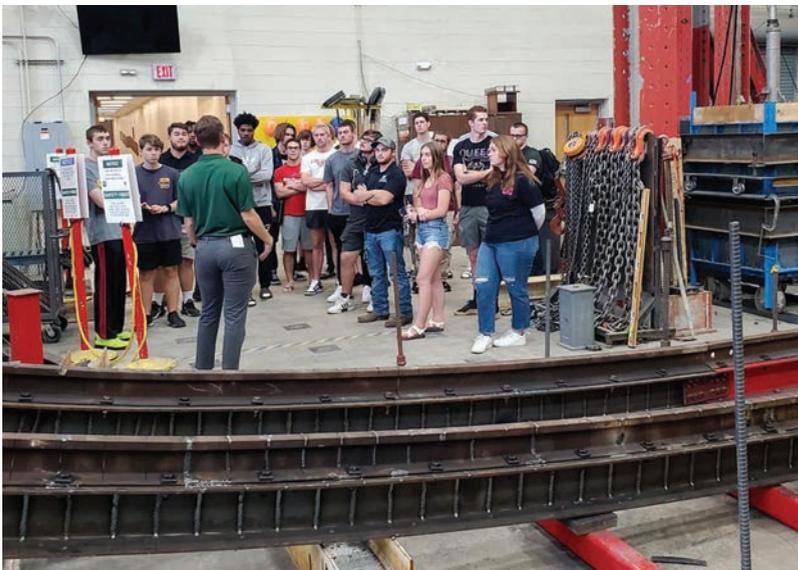
ASCE

AMERICAN SOCIETY OF CIVIL ENGINEERS

Clean-up efforts

Students in both Rolla and Springfield are doing great work in their clean-up efforts to protect the natural environment. It was even recognized and highlighted by ASCE headquarters.





HOMECOMING 2022

Homecoming Weekend 2022 kicked off with alumni and freshmen touring the department. There were lots of great lab demonstrations and information tables hosted by faculty, staff, student organizations and design teams!

SADDLE UP, MINERS!

The St. Pat's Board revealed its new sweatshirt design at Pine and Rolla streets during Homecoming activities.

The 2023 theme is St. Pat's on the Prairie! All things western, farming and country are being planned for the 115th Best Ever. All sweatshirt profits go right back to fund the celebration.

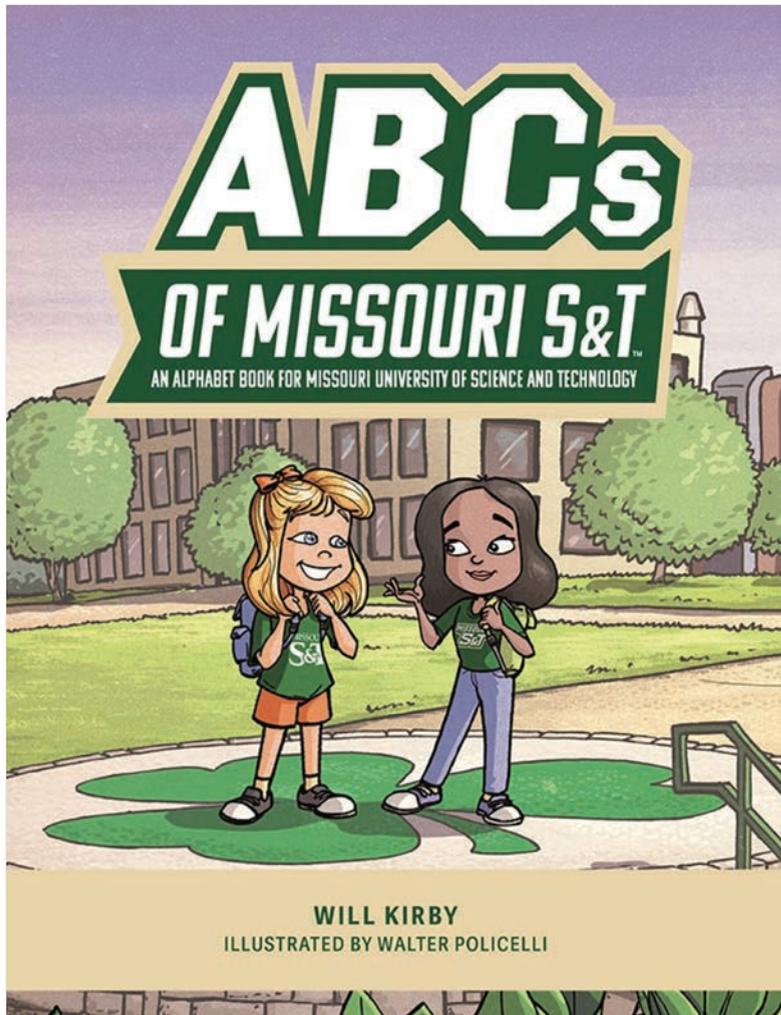
ST. PAT'S MERCHANDISE AVAILABLE!

- 8 a.m.-4 p.m. Monday through Friday; outside the library
- Saturdays; outside local businesses
- Browse stpats.mst.edu



Connect with us.

Email your news to: care@mst.edu



A great book for beginning readers & future dreamers

Will Kirby, ArchE'08, CE'08, has a new book out that would be perfect for any Miner.

ABCs of Missouri S&T will take you on an A-to-Z tour of the town, campus, and school that we have all come to know and love.

Purchase a copy for your kids, grandkids, nieces, nephews, etc. online at Mascot Books.

Will intends to donate a majority of the proceeds back to S&T!

Website: mascotbooks.com/mascot-marketplace/buy-books/childrens/picture-books/abcs-of-missouri-university-of-science-and-technology