THE UNIVERSITY OF
MEMPHIS®

Herff College of Engineering

2025 ANNUAL REPORT

BY THE NUMBERS...

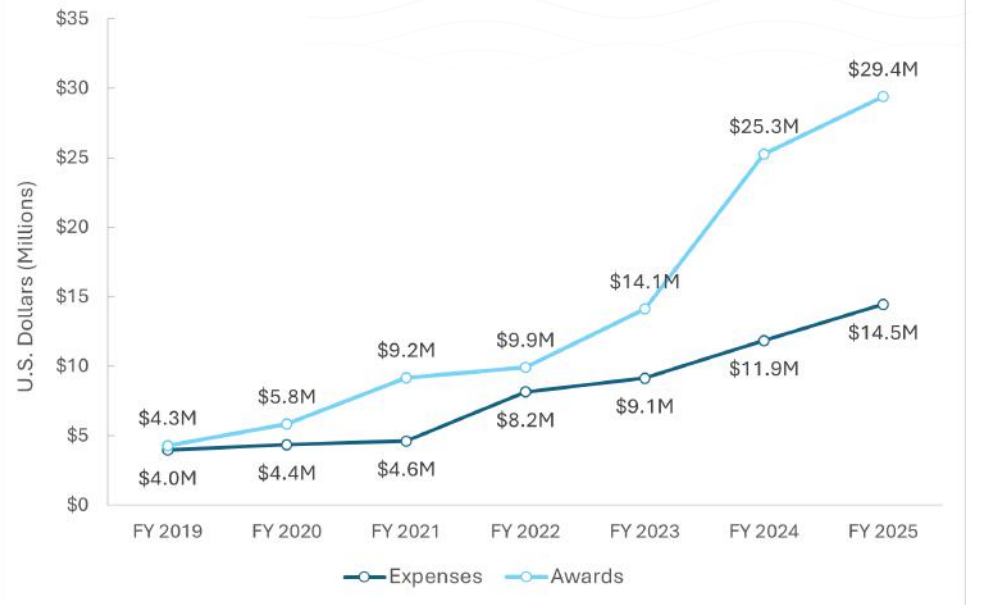
31 Tenured Faculty

9 Instructional Faculty

14 Tenure Track Faculty

10 Research Faculty

MEMPHIS RESEARCH



FY2025 Metrics

$14.5M in expenditures

123 proposals totaling $54.5M

64 awards totaling $29.4M (52% success rate)

$2,675,112 in indirect cost recovery

Dean's Message:

A year of innovation and opportunity

The Herff College of Engineering at the University of Memphis has experienced a year of exceptional progress and momentum. Our faculty, students, and staff are driving forward a bold vision—advancing high-impact research, fostering cross-sector partnerships, and delivering engineering solutions that respond to urgent societal and technological challenges.

From innovations in biomaterials, energy systems, advanced manufacturing, and sustainable transportation to nationally recognized STEM outreach programs, our work is translating discovery into opportunity. Our commitment to experiential learning, industry alignment, and inclusive excellence ensures that Herff graduates are well-prepared to lead in today's complex, fast-evolving engineering landscape.

As a public urban research institution, we are uniquely positioned to connect cutting-edge research with real-world needs—strengthening the regional economy and contributing meaningfully to the national STEM pipeline.

I invite you to explore this annual report, which highlights the impactful contributions of our faculty, students, and partners. We welcome opportunities for collaboration and dialogue, and I invite you to connect with me directly at O.Okoli@memphis.edu.

Sincerely,

Okenwa Okoli, Ph.D, CEng, CSci, FIMMM
Dean, Herff College of Engineering

"I realized that my scientific background and personal experience with hEDS could be combined to make a difference – to explore questions no one has asked before and to improve the lives of others facing this condition."

NSF AWARD EARNED FOR SCIENTIFIC BRILLIANCE

Prestigious fellowship empowers a next-generation biomedical innovator to explore transformative tissue engineering solutions

Millions face life-limiting complications from vascular disease and connective tissue disorders — Alexandra Snyder is fighting back with NSF-funded research that could transform healing from the inside out. This year, she received the highly competitive NSF Graduate Research Fellowship (GRFP), which will allow her to continue her groundbreaking biomedical engineering research as she pursues her PhD.

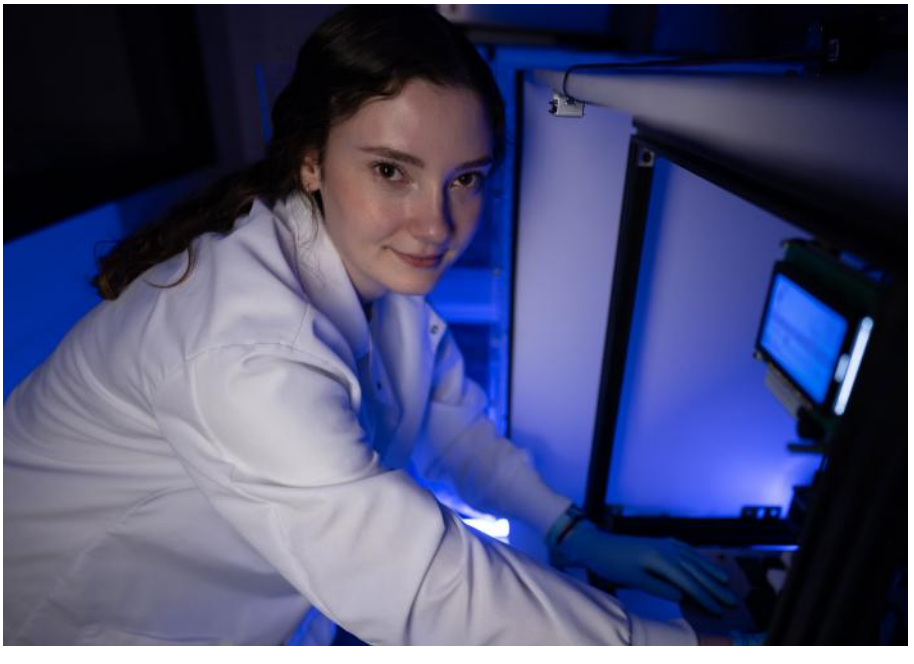
A May 2025 Biomedical Engineering graduate, Snyder has already made remarkable contributions to tissue engineering while navigating the challenges of hypermobile Ehlers-Danlos Syndrome (hEDS). Her work advances the understanding of how neutrophils influence tissue regeneration in hEDS and explores the development of innovative bioresorbable vascular grafts.

Developing transformative solutions for vascular and connective tissue disorders while elevating the University of Memphis as a leader in biomedical research.

Her research combines near-field electrospinning (NFES) techniques with Manuka honey–enhanced tissue templates to study how neutrophil activity and extracellular matrix remodeling can be modulated to improve wound healing. These studies have resulted in a first-author publication, multiple conference presentations—including international meetings—and collaborations that extend to the Medical University of South Carolina's Norris Lab, a global leader in hEDS research.

"I realized that my scientific background and personal experience with hEDS could be combined to make a difference — to explore questions no one has asked before and to improve the lives of others facing this condition," said Snyder, who received her diagnosis before attending college at the University of Memphis. This mindset drives her innovative approach, blending personal insight with rigorous experimentation to advance understanding of tissue regeneration.

In addition to her scientific achievements, Alexandra has become a passionate mentor and advocate for accessibility in STEM. She has guided high school students through independent projects, led tours and workshops for prospective engineers, and expanded outreach programs for women and students with disabilities through the West TN STEM Hub and the Society of Women Engineers. Her dual focus on rigorous research and community engagement embodies the broader impact vision of the NSF GRFP.



With this fellowship, Alexandra will continue her pioneering work on tissue engineering, connecting her lived experience with hEDS to scientific discovery, while fostering opportunities for the next generation of researchers.

Alexandra Snyder works in her mentor, Dr. Gary Bowlin's lab. Dr. Bowlin is also chair of Biomedical Engineering at the Herff College of Engineering..

ROARing forward: Memphis students compete on the world stage

East T-STEM Academy Students pose with other participants at the 2025 World Championships in Dallas, Texas.

Memphis students make global STEM impact

With support from the University of Memphis Herff College of Engineering, the East High School T-STEM Academy robotics program has evolved from an extracurricular activity into a measurable workforce development strategy. Participation more than doubled in one cycle and students collectively logged over 1,200 hours in engineering design and coding.

This rapid expansion reflects strategic support from the West Tennessee STEM Hub and Robotics Outreach at ROAR (ROAR), initiatives at the Herff College of Engineering. What began as two student teams grew to four in just one year, positioning Memphis students for national STEM recognition.

“None of this would have been possible without the unwavering support of Dr. Daniel Kohn, Dr. Dennis Koerner and the Herff College of Engineering,” said Bonheur Tumurere, STEM II & III teacher and Engineering & Robotics Club sponsor at East T-STEM Academy. “We are grateful for the investment they have made in our students and for helping us empower the next generation of STEM leaders.”

The college’s investment yielded immediate results when East T-STEM advanced to the 2025 VEX World Championship in Dallas. It was the only program representing Memphis and one of just 16 from Tennessee selected to compete on the global stage. Across nine qualifying matches the team secured four wins and improved its international skills ranking.

Participation also had lasting educational impact. Students returned with increased confidence, stronger technical skills and a readiness for future STEM challenges.

“We were the only team from Memphis and we proved

Through hands-on robotics experience, mentorship and national competition exposure, East T-STEM Academy students are gaining the technical skills, confidence and problem-solving abilities needed to excel in STEM fields, positioning Memphis as a hub for future engineering talent.

we belong on the world stage," said Dr. Daniel Kohn, ROAR coordinator and associate professor of Engineering Technology. "This program shows students what's possible and once they see it, they start to believe they can achieve it."

All four East T-STEM teams are now preparing for the next regional challenge in St. Louis, signaling sustained momentum. Support from community organizations and sponsors continues to enable hands-on STEM engagement, helping students build foundational skills in engineering, technology and teamwork that align with workforce development priorities for the region.

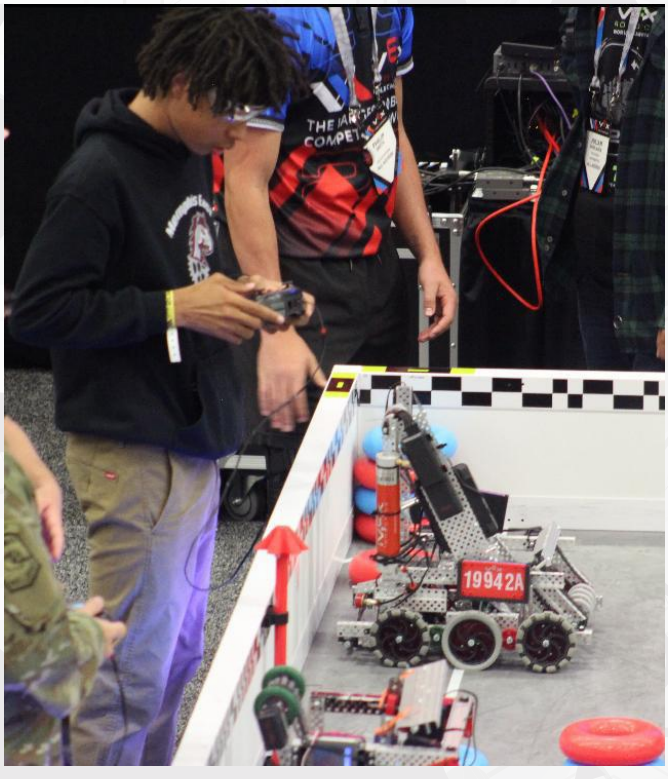
PROGRAM HIGHLIGHTS

» A 100% STEM retention rate.

» Participation has more than doubled in one cycle.

» More than 1,200 hours in engineering design and coding logged by students.

East T-STEM Academy students prepare for inspection before the World Championships in Dallas.



East T-STEM Academy student operates their robot during a qualifying match..

East T-STEM Academy Robotics team in Dallas

Funding and Sponsors

- Terra-Vaults Inc
- INT LLC
- Ben Buffington
- Steven Levits

Building skills, shaping futures

The University of Memphis Herff College of Engineering is cultivating the next generation of engineers and technical professionals through hands-on learning, mentorship and real-world exposure. Programs such as the West Tennessee STEM Hub and Girls Experiencing Engineering (GEE) give students the skills, confidence and guidance needed to pursue STEM careers while preparing undergraduate and graduate students to be effective mentors and leaders. Together, these initiatives strengthen Tennessee's talent pipeline and support workforce readiness in engineering and technology fields.

These programs create meaningful pathways for students to engage with STEM, gain professional experience and develop the skills necessary to contribute to Tennessee's technical workforce and innovation ecosystem.

STEM ambassador Kayla Marie Simmons puts together educational materials for an elementary school visit.

West Tennessee STEM Hub: Engaging regional students, teachers

The West Tennessee STEM Hub provides students and teachers with immersive STEM learning experiences that span classrooms, labs and community projects. Activities include mentorship, design challenges, teacher professional development, and exposure to higher education and industry professionals. Collaborative partnerships with STEM community leaders and support from the College of Education and College of Arts and Sciences help make these opportunities possible.

Each year, more than 30 undergraduate students and three graduate students from the Herff College of Engineering support program activities while gaining leadership experience. Monthly virtual professional development sessions and an annual in-person conference reach roughly 100 educators, strengthening STEM teaching throughout West Tennessee.

"The STEM Hub and Urban STEM projects give students real-world exposure to engineering and science, helping them develop problem-solving skills and a clear path to technical careers. Our undergraduate and graduate mentors gain leadership experience, and the students we serve are better prepared for success in college and beyond," Stephanie Ivey, Civil Engineering professor and program director.

"Serving as a STEM Ambassador has shown me that leadership isn't just about organizing—it's about opening doors for younger students. Helping them discover that they belong in STEM has been one of the most rewarding experiences of my college career."
— Kayla Marie Simmons

Participation in the Urban STEM Collaboratory, a National Science Foundation-funded partnership, gives academically talented students mentorship, financial support and strategies to improve retention, academic performance and workforce readiness. Data show that these students outperform peers in GPA, math and major courses, retention and graduation rates.

GEE: Inspiring future engineers

For more than 20 years, the Girls Experiencing Engineering (GEE) program has introduced young students to real-world engineering. Through team-based design challenges, mentorship from University of Memphis students and faculty, and interaction with industry professionals, participants explore multiple engineering fields early, building problem-solving skills and confidence.

Dr. Stephanie Ivey (left) introduces GEE participants to International Paper guest speakers during a 2025 summer programming event.

Since its founding in 2004, GEE has reached over 2,000 elementary, middle and high school students across the Mid-South. Tracking shows strong outcomes for alumni: 95% attend college, 58% pursue STEM majors, 28% select engineering, and 23% enroll at the University of Memphis.

"GEE gives students a hands-on, immersive experience that makes engineering real and exciting. We aim to show students what's possible, help them build problem-solving skills, and inspire them to see themselves as future engineers," said Dr. Ivey, program director.

Undergraduate and graduate students serve as mentors and activity leaders, gaining leadership and communication experience while inspiring younger students to see engineering as accessible and achievable.

Impact on K-12 Students

81% of students working with STEM Ambassadors say that we "made learning easier"

83% of students working with STEM Ambassadors reported more interest in STEM majors

Programs' Highlights

Programs: West Tennessee STEM Hub and Girls Experiencing Engineering (GEE)

Student Reach: Over 2,000 K–12 students served since 2004

Mentorship: 30+ undergraduate students and 3 graduate students annually support Hub activities; GEE students serve as mentors to younger participants

Teacher Engagement: Monthly virtual professional development sessions and an annual in-person conference reach ~100 educators each year

Outcomes for Students:

- Urban STEM participants outperform peers in GPA, math, retention and graduation rates
- GEE alumni: 95% attend college, 58% pursue STEM majors, 28% select engineering, 23% enroll at the University of Memphis

Hands-On Learning: Design challenges, mentorship, exposure to industry professionals, and real-world problem-solving opportunities

Workforce Preparation: Programs develop leadership, communication and technical skills for undergraduate and graduate mentors while preparing K–12 students for future STEM careers

Community Impact: Strengthens the STEM pipeline, enhances teaching quality, and supports workforce readiness in West Tennessee

Early detection, real impact

Dr. Amber Jennings, Biomedical Engineering professor, working in the lab with two undergraduate students.

Infections linked to medical devices can be deadly, especially for hospitalized patients, older adults or those with chronic wounds. Traditional monitoring often relies on visual checks or lab testing that can take hours or days, sometimes requiring removal of wound dressings or catheter components, which can slow healing and increase risks.

Now, a team at the University of Memphis Herff College of Engineering is changing how infections are detected. Led by Department of Biomedical Engineering Associate Professor Dr. Amber Jennings, biomedical engineers, graduate students and clinicians have developed a colorimetric sensor that visually signals the presence of common pathogens such as *Staphylococcus aureus*. While it doesn't identify the exact microbe, the sensor gives patients, caregivers and clinicians an early warning when bacteria may be colonizing a wound or urinary tract.

"Our goal is to provide patients and caregivers with an accessible, real-time signal that allows infections to be identified and managed before they escalate," said Dr. Jennings.

The innovation has quickly moved beyond the lab. The team launched ChromatoCare Innovations, a student- and faculty-led startup, winning recognition in competitions like Tiger Tank, where an undergraduate team placed second for a color-changing wound dressing. They were also finalists in the National Institute on Aging Startup Challenge, gaining support to develop a catheter-based sensor for early urinary tract infection detection.

Students are deeply involved—from ideation and testing to entrepreneurial activities—gaining hands-on experience in biomedical research, innovation and commercialization.

"Working on ChromatoCare has shown me how research can go from an idea in the lab to something that could save lives," said a student participant.

Dr. Jennings said this hands-on involvement is one of the project's major benefits.

"Students gain experience turning research into real-world solutions. This project shows how Memphis innovation can improve lives worldwide."

The potential impact is enormous: earlier infection detection could reduce healthcare visits, ease hospital workloads and improve patient outcomes, particularly in remote or underserved communities.

Backed by the NIH, the University of Memphis Research Foundation and other partners, ChromatoCare Innovations exemplifies how Memphis innovation translates cutting-edge science into practical solutions that save lives.

ChromatoCare Innovations pairs biomedical research with student entrepreneurship to deliver early infection detection that improves patient outcomes, reduces hospital visits and expands healthcare access.

Dr. Jennings demonstrates colorimetric sensor that visually signals the presence of common pathogens.

Redesigning the future of energy systems

Designing tomorrow's energy generation systems is no simple task. From structures that must withstand fierce environmental conditions to control systems that keep power flowing steadily, every detail matters.

Traditionally, engineers have approached these challenges step by step, solving physical design and control problems separately. But a new project led by Dr. Yong Hoon Lee, assistant professor in Mechanical Engineering at the Herff College of Engineering, is rewriting that playbook.

The not-yet-named initiative is creating an open-source software suite that combines multiple layers of complex energy system design into a single process with "All-At-Once" approach. By integrating a control-co-design framework, this project enables engineers to optimize both the physical structure and control strategies of large-scale energy systems concurrently to capture their synergistic interactions.

The result? Faster development cycles, lower engineering costs and better performance predictions for next-generation energy systems.

"The open-source toolset breaks down the barriers created by siloed design, giving us a shared view of the overall system's techno-economic performance from the outset and opening the door to stronger, more innovative solutions," said Dr. Lee.

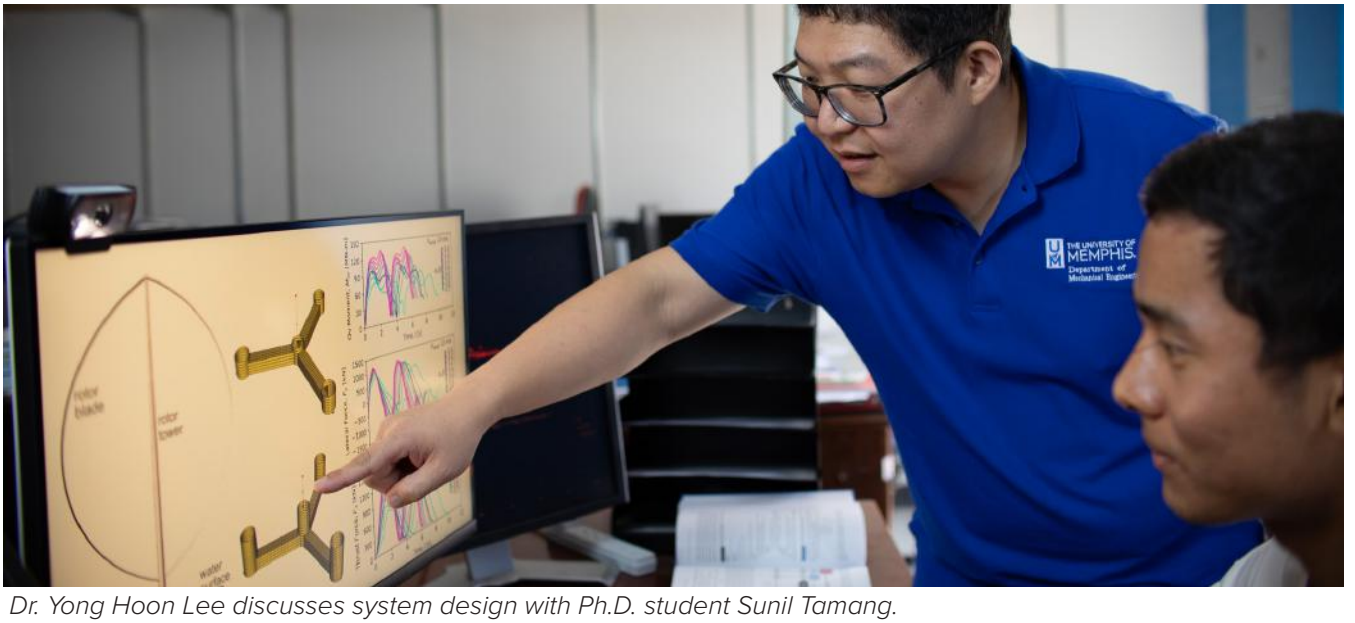
This groundbreaking toolset is more than just software—it's a bridge between research, industry, and education. Sunil Tamang, Ph.D. student working in Dr. Lee's lab, has played a leading role in building key modules, gaining valuable hands-on experience with advanced modeling and optimization.

> Energy system design is becoming faster, smarter and more affordable while students gain the skills needed for careers in a rapidly growing energy workforce.

"It's rewarding to know that what I'm building here could directly shape how industry designs the energy systems of the future," said Tamang.

While work continues in the lab, industry partners are already testing prototypes, incorporating the workflow into their own proprietary design studies.

With support from the U.S. Department of Energy's ARPA-E program, this initiative is proving to be a catalyst: accelerating the transition of innovations from university labs to industry practice while preparing a highly skilled workforce to lead the future of the energy sector.



Dr. Yong Hoon Lee discusses system design with Ph.D. student Sunil Tamang.

Driving Change Across TENNESSEE

The Herff College of Engineering is transforming the future of transportation in Tennessee through data science, community partnerships and student-driven innovation. Led by Dr. Sabya Mishra in the Department of Civil Engineering, four coordinated research initiatives are improving freight efficiency, expanding transit access, reducing impaired-driving risks and supporting workforce mobility for major regional employers. Together these efforts strengthen economic competitiveness while preparing students for engineering careers that directly serve the public good.

Supporting freight systems that keep Tennessee moving

Through the CEAT Mobility Dashboard, researchers are developing a decision-support tool tailored to freight operations that are critical to Tennessee's economy. The platform integrates travel time and speed data, crash records, land use and freight facility locations to identify safety risks and congestion challenges along key corridors.

"I've been able to apply classroom concepts to real freight data and help create a tool that will directly support trucking operations across the state."
– Md Tawkir Ahmed

The dashboard generates actionable insights for enforcement, incident management and infrastructure investment. It also identifies gaps in truck parking and EV charging, improving planning for cleaner freight operations. Graduate and undergraduate students contribute to data engineering, geospatial analytics, machine learning and dashboard design, gaining hands-on experience with industry technologies.

Improving transit access through on-demand innovation

Memphis' low-density neighborhoods can be difficult to serve through traditional fixed-route transit. Through the Ready! microtransit initiative, UofM researchers are using predictive modeling and data-driven route optimization to reduce operating costs and improve community access to jobs, healthcare, education and grocery options.

"Working on the Ready! project showed me what it means to engineer practical solutions that make a difference in our city."
– Ishant Bonde

The program demonstrates how flexible service can create stronger first-mile and last-mile connections. Students support survey design, modeling and system evaluation, applying classroom knowledge to improve mobility for residents across Memphis.

These transportation research initiatives improve mobility, strengthen safety and expand workforce opportunity while preparing University of Memphis students to lead the future of engineering in Tennessee and beyond.

Preventing impaired-driving crashes with data insight

Alcohol-impaired driving remains a major safety threat in Tennessee. To help agencies target high-risk locations and time periods, researchers are building a predictive risk analysis framework that identifies where crashes involving impaired drivers are most likely to occur.

An interactive dashboard translates spatial-temporal analytics into accessible insight for law enforcement, policymakers and community organizations, enabling smarter prevention strategies. The effort connects engineering research to community safety outcomes throughout the state.

A wrecked car involved in DUI was brought to campus during the 2025 Drive Safe Campaign held by Dr. Sabya Mishra, Civil Engineering professor, and his researchers. The event was co-sponsored by the University of Memphis and the Tennessee Highway Safety Office (THSO).

"I've learned how to translate data into tools that help save lives on Tennessee's roads."
– Veera Manikanda Prabhu Nagamanickam

Graduate student Ishant Bonde helps student during an impaired driving demonstration.

Strengthening workforce transportation for regional growth

Major industrial expansions like Blue Oval City are creating thousands of new jobs in rural communities with limited transportation options. To support these emerging corridors, researchers are developing an AI-enabled planning framework that combines machine learning with community feedback to optimize future workforce transit solutions.

By improving access to reliable commuting options, the project supports economic stability and strengthens quality of life for workers and their families. Students gain real-world experience in modeling, stakeholder engagement and multimodal planning that will prepare them for careers shaping the region's future.

Members of C-TIER and CEAT stand with THSO personnel during the 2025 Drive Safe Campaign hosted by Dr. Sabya Mishra, Civil Engineering professor, and his researchers.

Federal partnerships powers plasma innovation

Dr. Ranganathan Gopalakrishnan (back and to the right), Mechanical Engineering professor, working with students in his lab.

This year, the University of Memphis celebrated new achievements in the Plasma, Particles, Powders, and Aerosol Research Laboratory (P3ARL) under the direction of Dr. Ranganathan Gopalakrishnan, Mechanical Engineering professor in the Herff College of Engineering. Built with support from the Army Research Office and the U.S. Department of Energy, P3ARL now provides advanced experimental systems that enable both fundamental and applied plasma research with real-world implications in energy, national defense, manufacturing, and environmental technologies.

"At P3ARL, our research pushes the boundaries of plasma science, exploring complex interactions in aerosols and powders that have the potential to transform energy, manufacturing, and materials technology," said Dr. Gopalakrishnan.

A major focus of P3ARL is preparing the next generation of scientists and engineers. Through the Army Educational Outreach Program (AEOP), two undergraduate students and two high school students joined the laboratory this year, gaining hands-on experience investigating the plasma processes used in materials synthesis.

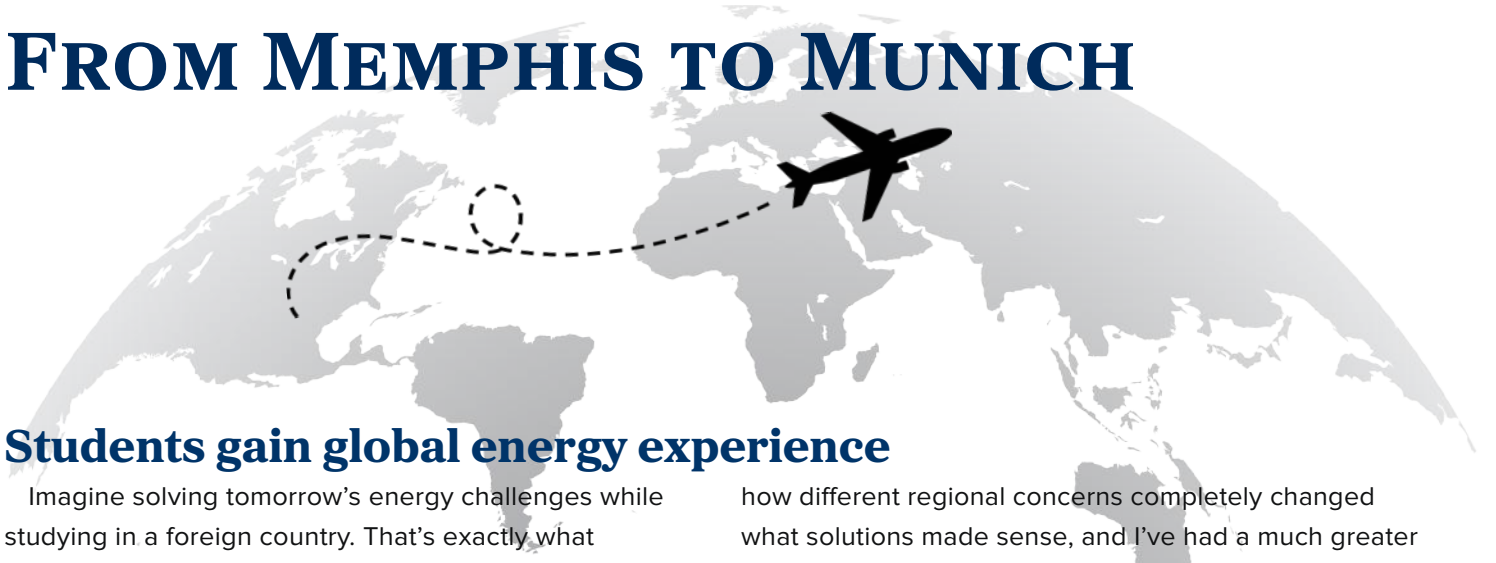
P3ARL has also deepened its national research connections. A two-year collaboration with Auburn University's Magnetized Plasma Research Laboratory funded by the Department of Energy enabled University of Memphis PhD students to conduct experimental work on-site and contribute to the setup of new plasma research capabilities upon their return. This collaboration continues to generate peer-reviewed publications and opens doors to ongoing scientific exchange.

Together, these advancements demonstrate the University's growing strength in plasma research — and provide students meaningful opportunities to contribute to emerging technologies that drive U.S. innovation and security.

With support from the Army Research Office and the U.S. Department of Energy, the University of Memphis continues to grow world-class plasma research capabilities — advancing discovery, student training, and high-impact collaborations across the region and the nation.

(Pictured here) P3ARL is actively engaged in commercializing a patented ultrasonic powder dispersion technology.

From Memphis to Munich



Students gain global energy experience

Imagine solving tomorrow's energy challenges while studying in a foreign country. That's exactly what University of Memphis students will do through the InteGRATE program, a summer research initiative that sends U.S. students abroad to gain hands-on experience in energy systems.

Partnering with the Technical University of Munich (TUM), students will engage in interdisciplinary research, explore advanced energy technologies and work alongside international experts. They can choose their research areas and mentors, tailoring the experience to their interests. For many, it's a career-defining opportunity: gaining technical skills while seeing firsthand how energy challenges differ from region to region, country to country.

Dr. Alexander Headley, who leads the program, knows the value personally.

"During my graduate studies, I was lucky enough to have a similar experience to this one, learning and discussing energy problems with researchers across Europe. It really gave me a much clearer picture for how different regional concerns completely changed what solutions made sense, and I've had a much greater appreciation for regionality ever since. What works in Germany may not work in the US," he said. "That said, giving our students to experience how different regions approach the same problems will help them build a broader perspective see a wider array of solutions than they would come across in the classroom. I'm really excited to give our students this great opportunity."

The program not only prepares the next generation of STEM leaders but also strengthens global research collaborations and brings a broader perspective to energy studies here in Memphis.

Each summer, five students will gain these transformative experiences—returning ready to apply their knowledge locally, nationally, and internationally.

"The InteGRATE Fellowship feels like the perfect step toward combining my classroom knowledge, hands-on research, and passion for sustainable energy into something meaningful," according to one cohort.

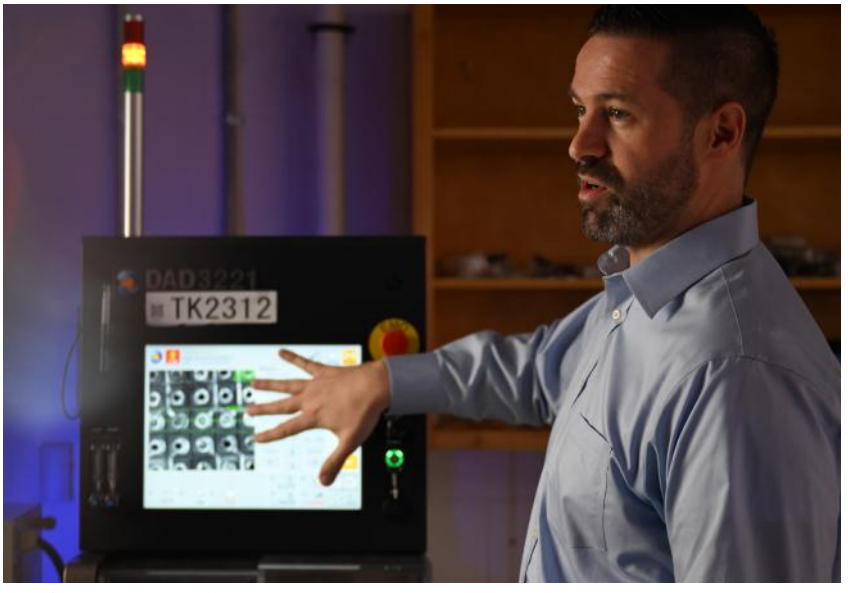
Drs. Alexander Headley (back row left) and Yong Hoon Lee (back row right) are pictured with students who were chosen for InteGRATE: (from left) Benjamin Wise, David Thomas Braese, Jayce Fiene, Jennifer Farler and Madison Galloway.

The InteGRATE program equips UofM students with hands-on international research experience, technical expertise, and a global perspective, preparing them to tackle complex energy challenges and drive innovation in renewable energy systems worldwide.

Building a STEM pipeline for the future

In Memphis, the demand for engineers is growing faster than the existing pipeline of students who are prepared to fill those roles. Many K-12 schools in the region face resource challenges, leaving some students without adequate access to the kinds of experiences that spark an interest in science and technology.

At the same time, faculty at the University of Memphis Herff College of Engineering are encouraged and willing to expand the impact of their federally-funded research through outreach. However, creating meaningful experiences and practical, sustainable interactions for K-12 schools can be a challenge.



Dr. Carl Herickhoff explains new lab equipment..

The STEM Pipeline Partners Program (STEM-P3) bridges that gap. The initiative makes it simple for UofM faculty, student clubs and community educators to connect and collaborate, creating outreach opportunities that bring real-world STEM experiences directly to classrooms. K-12 teachers can browse offerings through a centralized website and schedule interactive sessions that introduce their students to new educational and career pathways.

"Helping them (younger students) discover that they belong in STEM has been one of the most rewarding experiences of my college career."
– Devin Johnson

"STEM-P3 provides a structured and accessible pathway for faculty to extend the impact of their research beyond the university, while simultaneously offering teachers practical resources to engage and inspire students toward career opportunities as scientists and engineers," says Dr. Carl Herickhoff. "By connecting classrooms and campus resources, we're fostering the next generation of innovators."

Only in its second year, the program is already reshaping the region's STEM pipeline. Local students are gaining exposure to career opportunities they may never have imagined, while faculty and students at the UofM are finding new ways to connect their research and expertise with the community.

Undergraduate "STEM Ambassadors" are at the heart of the effort—managing the website, coordinating logistics and ensuring that every outreach activity runs smoothly.

"Serving as a STEM Ambassador has shown me that leadership isn't just about organizing—it's about opening doors for younger students. Helping them discover that they belong in STEM has been one of the most rewarding experiences of my college career, and I'd encourage any student to be part of that journey," said Devin Johnson, STEM ambassador and Electrical and Computer Engineering student.

By preparing the next generation of scientists and engineers while empowering today's faculty to extend their impact, STEM-P3 is planting the seeds of long-term change for Memphis and beyond.

STEM-P3 connects Memphis K-12 classrooms with UofM faculty and students, opening doors to further STEM education and helping prepare the workforce of the future.

Helping first-year engineers thrive

Dr. Isaiah Surbrook (right) stands with inaugural Redshirt program class. Ivan Rivera (left) is a sophomore Mechanical Engineering student who is quoted in this article.

The Engineering Redshirt Program provides holistic, relationship-based support to underprepared first-year students, improving retention, GPA and a sense of belonging while preparing the next generation of Memphis engineers for long-term success.

Starting college can be overwhelming—especially for first-year engineering students who enter below Calculus 1. Without the right support, these students often struggle, and many leave the program before completing their degree. The Engineering Redshirt Program (ERP) at the University of Memphis addresses this challenge head-on.

ERP combines peer mentoring, a summer bridge program, academic support, and social engagement to help students succeed in their first year. By meeting students where they are—both academically and socially—the program builds confidence, motivation and a strong sense of belonging.

"The Redshirt Program has played a major role in my growth as an engineering student."
– Ivan Rivera, sophomore in Mechanical Engineering

"It's not just about passing tests; it's about giving students the strategies and support they need to thrive in engineering," said Dr. Isaiah Surbrook, assistant dean for Herff Undergraduate Student Services.

The results speak for themselves. ERP participants have an average GPA of 3.14 and a retention rate of 87.5%, well above the historical average for underprepared students. Even with busy schedules and many commuting students, 80% participated in group gatherings, and students averaged six one-on-one peer mentor meetings. These interactions foster accountability, build STEM identity and create connections that last far beyond the classroom.

"The Redshirt Program has played a major role in my growth as an engineering student," said Ivan Rivera, sophomore Mechanical Engineering student. "It introduced me to so many different people, helping me form new relationships and meaningful connections. Through mentoring, academic support, and a strong sense of community, I've built confidence and truly feel like I belong in engineering." ERP also offers an alternative to traditional remediation models, reducing stigma while promoting holistic student success. By supporting academic skills, motivation and engagement in STEM, the program provides early evidence that relationship-based, community-focused approaches can transform student outcomes.

With ongoing support from the Tennessee Board of Regents and the Herff College of Engineering, ERP continues to give students the foundation they need to persevere, graduate and succeed in engineering careers—keeping Memphis at the forefront of developing talented, resilient engineers.

Strong Results

3.14 Average GPA

87.5% Retention Rate

well above the historical average for underprepared students

Smart biomaterials for faster recovery, better lives

The Biomaterials Lab at the University of Memphis led by Joel D. Bumgardner, PhD, is pioneering affordable regenerative solutions that improve healing from severe injuries to skin, bone and muscle. By developing innovative scaffolds and membranes using natural biopolymers such as chitosan, the lab is advancing treatments that reduce the need for invasive surgery, shorten recovery times and restore functionality for patients. Students are central to this work and gain hands-on experience in biomaterials innovation that translates directly to careers in health care and medical device industries.

Dr. Joel Bumgardner works with a student in his Biomaterials Lab.

"We are developing biomaterials that make healing easier safer and more accessible while preparing the next generation of innovators. Our goal is to create affordable tools that restore tissue function help patients return to their lives sooner and give students the skills to lead future breakthroughs," said Dr. Bumgardner, Biomedical Engineering professor.

Healing severe burns with off-the-shelf skin scaffolds

Severe skin injuries are difficult to treat and often require donor skin, which may be limited in major burn cases. The Biomaterials Lab is developing chitosan-based sponges and nanofiber membranes designed to replace traditional grafts. These materials provide structural support for tissue regrowth, lower infection risk and eliminate the need for secondary donor sites while remaining scalable and cost-effective.

Discoveries in the Biomaterials Lab accelerate healing, reduce surgeries and deliver affordable regenerative treatments that help patients recover faster and return to their lives sooner.

Researchers evaluate healing performance through mechanical testing, cell culture and animal models to prepare the technology for future clinical use.

Restoring bone for better dental implant success

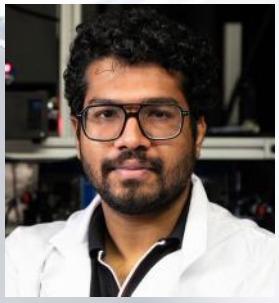
To address bone loss caused by gum disease and dental trauma, the lab is engineering biodegradable guided bone regeneration membranes and bone graft materials that support bone rebuilding. The electrospun chitosan nanofibers mimic native tissue structure to promote strong bone regrowth and preserve dental function.

This work has produced two patents and helped launch Nature Found Inc. to advance commercialization across dental and orthopedic markets.

Bioprinting muscle to restore mobility after trauma

Volumetric muscle loss from injury or surgery can create lifelong physical challenges. The lab is developing a UV-cured hydrogel scaffold seeded with muscle cells that offers a personalized solution to support muscle regeneration and stronger functional recovery. Combined with 3D bioprinting, this approach aims to reduce scarring and help patients return to work sooner.

Spotlight:
Graduate scholars to watch



Dinil Jose, Mechanical Engineering

Dinil studies dusty plasmas, where tiny particles interact within high-energy environments, to better understand how they move and behave. His research helps advance diagnostic tools that support technologies such as fusion energy and semiconductor manufacturing while deepening knowledge of plasma behavior seen throughout the universe.

Md Rafi Ur Rahman, Electrical and Computer Engineering

Rafi studies how drones operate in harsh weather and dense urban environments to improve their safety and performance. At the University of Memphis he helps develop a testing facility that simulates real challenges and advances flight-control systems for safe UAV operations in critical industries.

Mahtab Rahmati, Mechanical Engineering

Mahtab uses high-performance computing to understand turbulence so engineers can design more efficient energy systems and aerodynamic technologies. She works with Dr. Foti's research group to support the development of a new meso-scale wind tunnel that connects simulations with real-world data.

Emilio Salvador Castorena Regal, Civil Engineering

Emilio uses remote sensing tools such as LiDAR and hyperspectral data to assess how restored streams change over time. His goal is to improve the way stream restoration projects are monitored by increasing spatial and time resolution so agencies can better protect water resources and natural ecosystems.

Thomas Pascarella Watson, Electrical and Computer Engineering

Thomas focuses on advancing technologies that support precision agriculture and environmental management, aiming to make these systems more efficient and accessible. He chose the University of Memphis for its strong resources and collaborative environment and says the most rewarding part has been designing and building solutions that make a real impact.

MEMPHIS COMMUNITY

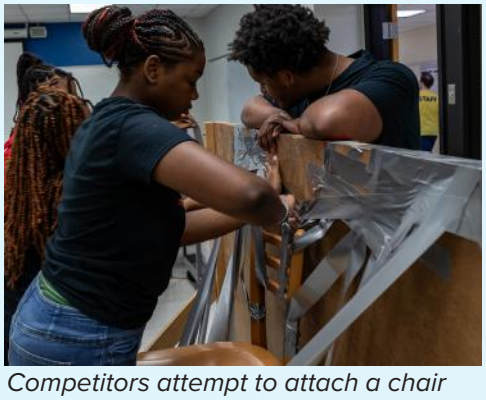
The Herff College of Engineering strengthened its connection to the Memphis region through outreach programs that encourage interest in STEM fields and support future engineers.

In November 2025 the College hosted the Delta Boulè STEM Summit, which brought high school students to campus for hands-on labs, a STEM fair and sessions focused on career pathways and internships. Dean Okenwa Okoli emphasized the value of early exposure to engineering, saying, “This is a moment for students to see not just what they can be but what they can become.”

Herff also continued its long-standing eDay tradition, welcoming students from grades 3 through 12 for demonstrations, lab tours and STEM activities that introduce young learners to engineering and give many their first look at a college environment.

These efforts reflect Herff’s commitment to supporting a strong STEM pipeline and working closely with schools, community organizations and employers throughout the region.

eDay Strengthens Herff’s Commitment to STEM Outreach



Competitors attempt to attach a chair to the wall with duct tape to test their engineering skills.

Each year the Herff College of Engineering opens its doors to the community for Engineering Day (eDay), a signature outreach event that brings engineering to life for students across the Mid-South. Designed for grades 3 through 12, eDay invites young learners, teachers and families to explore our engineering facilities, interact with faculty and students and experience the excitement of hands-on STEM learning.

Through demonstrations, lab tours and friendly competitions, students get to imagine themselves as future engineers while discovering how engineering shapes the world around them. For many it is their first time stepping onto a college campus, a moment that can ignite new goals and lifelong interests.

In 2026 eDay will move to a Friday to better support school schedules and create more accessibility for field trips and group participation. With expanded activities and enhanced engagement across every department, the event continues to grow as a gateway between the University of Memphis and the broader community.

By opening our campus and welcoming the next generation of innovators, eDay reflects one of Herff College’s core commitments: ensuring that engineering education is exciting, approachable and available to all.

Elementary school students attempt the eDay coding challenge. This was the first time this competition was offered.

Delta Boulè STEM Summit Expands STEM Pathways for Local Students

The Herff College of Engineering hosted the Delta Boulè STEM Summit in November 2025, welcoming high school students from across the Memphis region for a day dedicated to exploration, discovery and future planning in STEM fields. The event brought together students, educators, community leaders and industry partners who share a commitment to expanding access to engineering and technology careers.

During the summit, students participated in hands-on labs and demonstrations led by Herff faculty and students. Breakout sessions introduced attendees to engineering disciplines and the skills needed to pursue STEM degrees. A STEM fair highlighted programs and opportunities from campus units and community organizations, giving students a clearer picture of the pathways available to them.

Dean Okenwa Okoli emphasized the importance of reaching students early, telling attendees, “This is a moment for students to see not just what they can be but what they can become.” His message captured the purpose of the summit, which aims to inspire confidence and curiosity among young learners who may be exploring STEM for the first time.

The event was organized in partnership with the Delta Mu Boulè Educational Foundation along with schools and organizations that help strengthen the region’s education pipeline. Their support broadened student engagement and reinforced the shared goal of preparing the next generation of engineers and innovators.

Melvin Burgess, Delta Boulé Social Action chairman

“The annual Delta Boulé STEM Summit is more than an event—it’s a movement to empower the next generation of innovators. We are igniting dreams, shaping leaders and building a future where every young mind can rise to its fullest potential. Together, we are creating pathways that turn curiosity into innovation and vision into reality,” said Melvin Burgess, Social Action chairman, Delta Boulé.

By hosting the summit, the Herff College of Engineering continued its long-standing commitment to community outreach and youth engagement. The summit provided students with a meaningful introduction to campus, an opportunity to connect with mentors and a firsthand look at how engineering can shape their future goals.

60 for 60: The Community Behind Our Legacy

This collage features the 60 individuals recognized for helping shape the Herff community across 60 years of engineering excellence. Since opening in 1964, the Herff College of Engineering has produced some of the best and brightest, and we shared just a few with the world. The stores featured the achievements of faculty, staff, students and alumni who are pursuing or have earned multiple degrees from the College. Follow the QR code to the right to read about them.

Remembering "DOC"

The Herff College of Engineering recognizes with gratitude the remarkable contributions of David Morris, known to many as Doc, whose dedication to our students and programs extended far beyond his professional background. Through his service in the undergraduate design lab and the significant support provided by his family foundation, he played a central role in enhancing our learning environment and expanding opportunities for student success.

The reflections that follow offer a glimpse into the legacy of a man who believed deeply in what engineering education can do for the next generation.

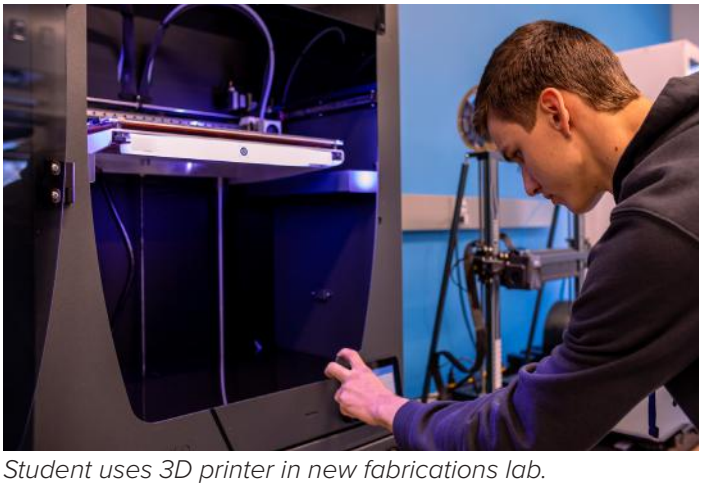
In Memory of Dr. David "Doc" Morris

As the Assistant Dean and someone who worked side by side with Doc for over six years, I have the privilege of sharing a personal tribute to a man who became an integral part of our Herff College family. Doc's journey with us began simply: he took a few engineering technology and electronics classes, got to know Professors Dan Kohn and Tom Banning, and from there, his involvement blossomed into something extraordinary.

Doc was one of those rare souls who could be delightfully demanding in the best possible way—always pushing us to do better, to think bigger, and to give our students every opportunity to succeed. And yes, as the one who often found myself on the receiving end of his high expectations, I can say it was a gift. His dedication was a testament to how much he cared.

Doc was not just a volunteer in our undergraduate design lab; he was a catalyst for growth. Thanks to his tireless dedication, we secured a transformative donation from his family's foundation that helped outfit and fund the three undergraduate design lab spaces in the ERIC building. He had a way of blending his Memphis roots and his background as a dentist into a role that was all his own—becoming a mentor, a storyteller, and a steadfast supporter of our students.

"Doc" and Dr. Isaiah Surbrook take selfie days before his passing.



Student uses 3D printer in new fabrications lab.

In every story he shared and every piece of advice he offered, Doc left a mark on this community that will never be forgotten. He may have been a dentist by training, but he became an engineer of hearts here at Herff. It's my honor to write these words and to celebrate a man whose legacy will live on in the many lives he touched.

- by Dr. Isaiah Surbrook, assistant dean for Student Services

Sophia Naweed, Junior in Mechanical Engineering

“Doc was not just someone who impacted my studies. He was someone who impacted my life, too.”

-Sophia Naweed

“I met Doc my first semester of freshman year, and I instantly knew that this was not someone I would know only in passing. That could never happen, even if he tried. I knew Doc for two years but even two days were enough to know that he was a kind, lively and youthful soul, one that makes you cheerful for your own life. As much as he talked about being a lone wolf, you would never find him on his own. He could talk to anybody about anything for as long as his KitKat bar would fuel him... only then could you catch a break from the conversation. He knew almost everything about just about everything, and never held back from sharing his wisdom, thoughts and opinions.

He was open minded and accepting of people, and always made sure no one was ever left behind. He was a mentor to me, a confidant, and a supporter. On a whim one day in the design lab, he said to me, “You know, we could really use someone like you here.” The design lab was an intimidating place to me at that time, with all sorts of machines and equipment I’d never seen before, so I told him no, I couldn’t do it, but Doc was not someone who could ever take no for an answer. He, with his unwavering faith in me, took me through everything, taught me CAD software semesters before I would learn it in a classroom, and reminded me of my potential until I started to see it for myself.

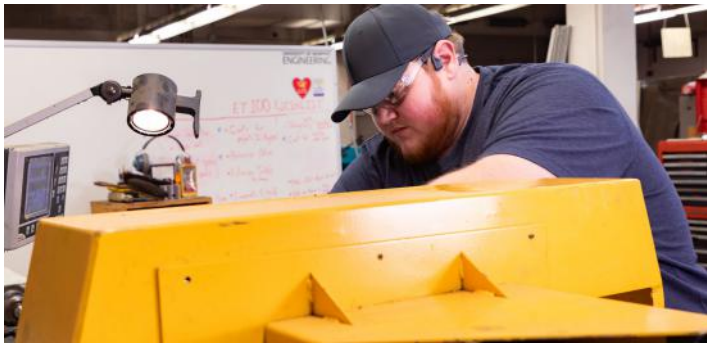
He was a teacher through and through. He taught me that it’s okay to take initiative, that it’s okay to fail sometimes, and that life goes on in spite of everything (all of this backed by personal anecdotes, of course).

Doc was a memorable and impactful man, and I will always look back on my time with him with gratitude and appreciation. As will, I’m sure, everyone who has been in his company. Thank you, Doc, for everything. Rest in peace.”

Gabriel Lail, Junior in Mechanical Engineering

Dr. David Morris— “Doc,” as he was lovingly known to us—was not your average faculty member; he was our mentor and, most importantly, our friend. Despite his wisdom and knowledge far exceeding most, Doc remained a servant at heart. Volunteering three days a week in the Herff College of Engineering Small Fabrication Lab, he impacted us all through the selfless sharing of his vast experiences and technical expertise, which he imparted in his unmistakable storytelling style. Although not a formally trained engineer, he was an expert in all things 3D printing and never hesitated to take on a project of any kind. Through his actions and his mindset, Doc pushed us all to be lifelong learners, parttime tinkerers, and full-time appreciators of every moment we are given. He will be greatly missed.

John Green (ET ‘24), MS Engineering Technology



David Morris, “Doc,” “Doc-Ock,” he was a man of many names and professions as-well as the man that inspired me to be a better person. He was a stubborn man who always had to make sure your grammar was correct, but he was also the person who was always there for you. Even through the friendly bantering you could tell he was a kind, loving, caring person who loved to help others with their problems no matter who they were or how large the problem was. He inspired me to continue my education when times were tough, and I was on the verge of dropping out. He is the reason I am at where I am today as well as for my love of 3d printers. He truly was a one-of-a-kind person, and He will be missed greatly by a lot of people.

THE UNIVERSITY OF MEMPHIS

Herff College of Engineering