UNIVERSITY OF MISSOURI

Research, Innovation & Impact

2024 ANNUAL REPORT

Letter From Our Vice Chancellor

Dear Colleagues,

The past year has been a remarkable one for the Division of Research, Innovation and Impact at Mizzou. Together, we achieved a historic milestone: research expenditures surpassed half a billion dollars for the first time in university history, reaching $509 million. This record is a testament to the talent, dedication and perseverance of our research community, whose work is driving discoveries and innovations that address society's most pressing challenges.

This progress is also the result of strategic investments in Mizzou's research infrastructure. In 2024, we committed $3.6 million toward new, state-of-the-art instruments and equipment for our advanced technology core facilities, ensuring that our researchers have access to the very best tools to advance their work. At the same time, we expanded professional development programs to support early career faculty, foster interdisciplinary collaborations and enhance the competitiveness of research proposals.

These efforts are bearing fruit. In the pages ahead, you'll read about Mizzou investigators who are tackling critical issues in creative ways: removing nanoplastics from water (p. 15), harnessing the power of music to improve mental health (p. 10), using artificial intelligence to develop smarter flu vaccines (p. 13) and much more. These stories reflect only a fraction of the impact our researchers are making to create a healthier, more sustainable world.

On behalf of the Division of Research, Innovation and Impact, I extend my deepest thanks to the Mizzou research community and to our sponsors for your commitment and support. This collective success would not be possible without you.

With gratitude,

Thomas E. Spencer
Vice Chancellor for Research

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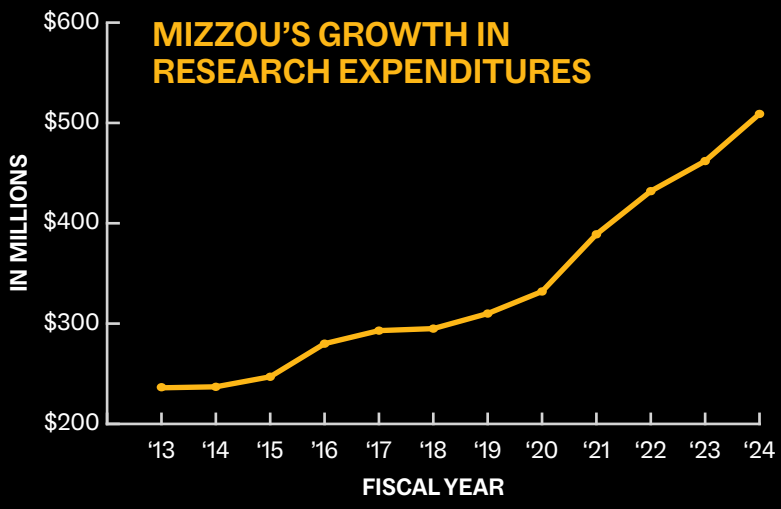
The Bond Life Sciences Center celebrated its 20th anniversary with a new wall art installation.

HISTORIC RESEARCH ACTIVITY FUELS INNOVATION

The University of Missouri **conducted more than $500 million in research** in FY2024, setting a new record and marking 11 years of consecutive growth.

Research expenditures FY2024

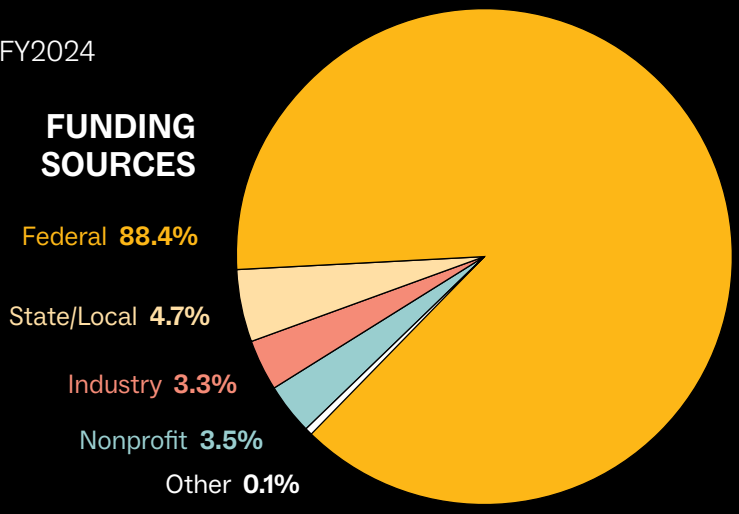
$509 MILLION
TOTAL RESEARCH EXPENDITURES



Source: Higher Education Research and Development (HERD) Survey reports, National Science Foundation

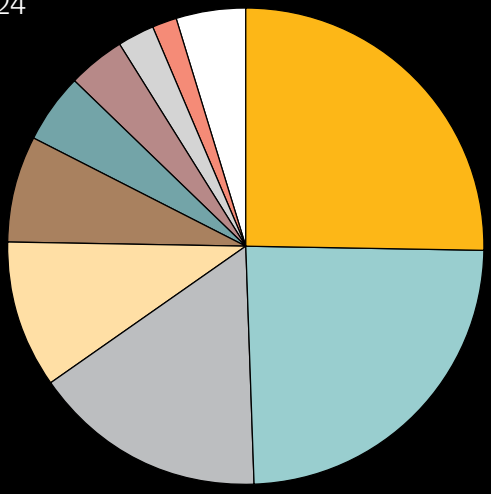
Grants and contracts FY2024

$525 MILLION
TOTAL SPONSORED AWARDS



Federal awards FY2024

$464 MILLION
TOTAL SPONSORED AWARDS



MAJOR FUNDING SOURCES

National Institutes of Health	25.4%
Other Health & Human Services Agencies	24.2%
Dept. of Agriculture	15.9%
Dept. of Education	9.9%
Nat. Science Foundation	7.2%
Dept. of Commerce	4.8%
Dept. of the Treasury	3.8%
Dept. of Defense	2.5%
Dept. of Energy	1.6%
Other federal	4.7%

1,386 DISTINCT AWARDS RECEIVED

978 DISTINCT INVESTIGATORS WON AWARDS

75 DISTINCT AWARDS OF $1M+

90 NEW INVENTIONS DISCLOSED

20 U.S. PATENTS ISSUED

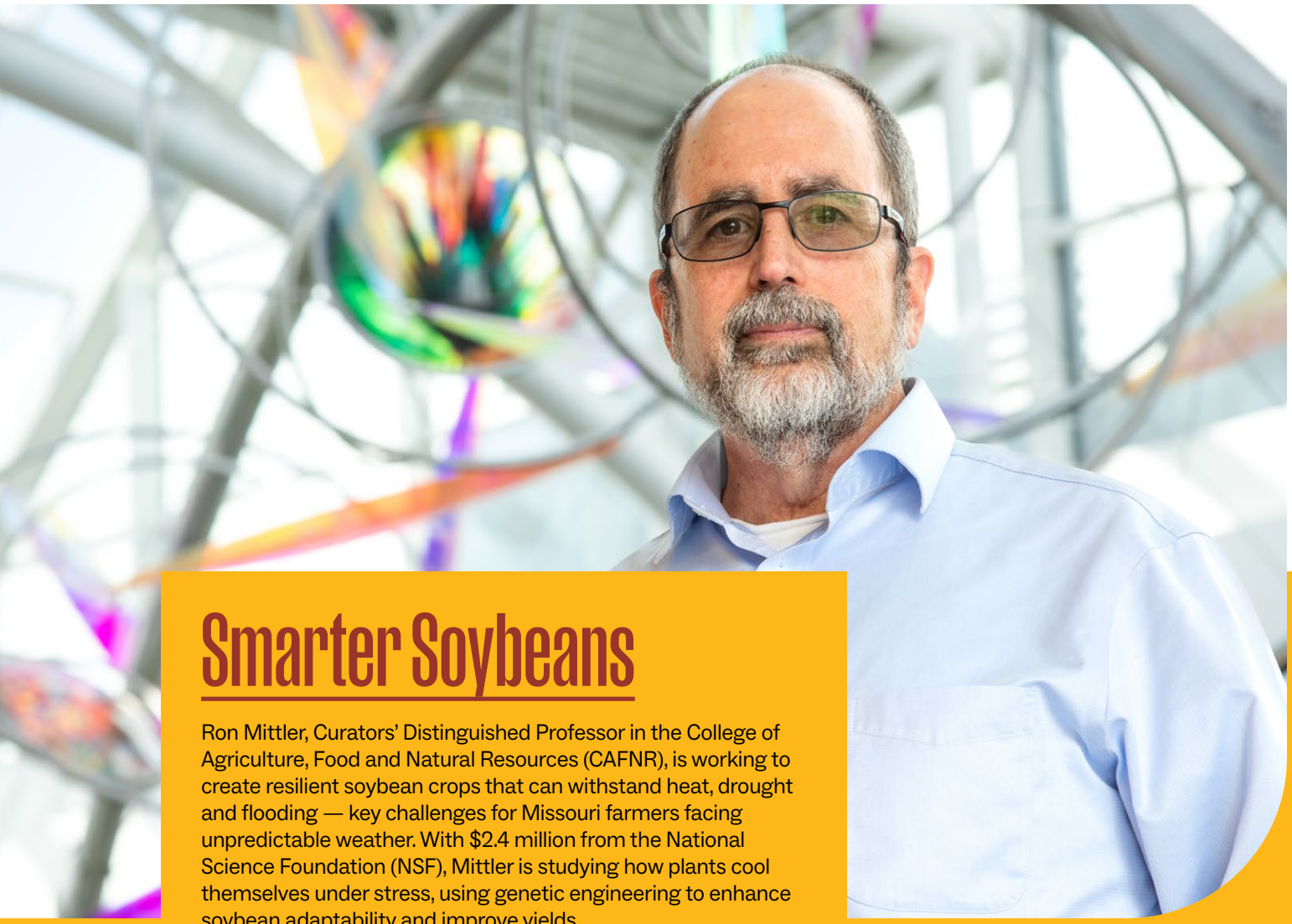
$16.8M LICENSING INCOME FROM COMMERCIAL PARTNERS

$2M+ INTERNAL RESEARCH COUNCIL GRANTS AWARDED TO FACULTY SINCE 2019

2.6K+ FACULTY BOOKS & ARTICLES PUBLISHED, 2023

NOURISHING THE GLOBE

Strengthening global food security through sustainable farming, safer supply chains and healthier nutrition.



Smarter Soybeans

Ron Mittler, Curators' Distinguished Professor in the College of Agriculture, Food and Natural Resources (CAFNR), is working to create resilient soybean crops that can withstand heat, drought and flooding — key challenges for Missouri farmers facing unpredictable weather. With $2.4 million from the National Science Foundation (NSF), Mittler is studying how plants cool themselves under stress, using genetic engineering to enhance soybean adaptability and improve yields.

By analyzing soybean genetic variability, Mittler's team worked with co-investigators Marc Libault and Felix Fritschi to explore how some plants open stomata only on their reproductive surfaces, balancing cooling and water retention to survive harsh conditions. His research aims to harness these natural adaptations for more resilient crops.

Mittler credits Mizzou's Interdisciplinary Plant Group (IPG) and Bond Life Sciences Center for fostering collaboration and advancing his work. "IPG is home to incredible collaborators, world-class facilities and resources," he said.

"Mizzou's Interdisciplinary Plant Group is home to incredible collaborators and world-class facilities."

— Ron Mittler

Tackling Hidden Hunger

More than 2 billion people suffer from hidden hunger, a form of malnutrition where individuals lack essential micronutrients — like vitamins and minerals — even though they consume an adequate number of calories.

To begin addressing this, Kiruba Krishnaswamy, assistant professor in both the College of Engineering and CAFNR, was awarded a five-year, $532,000 Faculty Early Career Development (CAREER) award from the NSF in support of her project FEAST (food ecosystems and circularity for sustainable transformation) framework to address hidden hunger.

Kirshnaswamy is partnering with the Osage Nation in Pawhuska, Oklahoma, to address hidden hunger and support food sovereignty through community-based, self-sustainable food practices. This process emphasizes the importance of preserving traditional agriculture practices while being ecologically sustainable.

“A linear food system is more focused on quantity or production, and sometimes during that process, food quality standards are not met,” Krishnaswamy said. “This can lead to people consuming empty calories. But, by making the system more circular, we’re tailoring solutions to the specific needs of individual communities, and then everyone can get the benefit of nutritious food in larger quantities.”

BIG SUPPORT FOR BIG AWARDS

The NSF CAREER award is the most prestigious honor for early career faculty, requiring a detailed proposal with research, broader impacts and an education plan. At Mizzou, the NSF CAREER Club helps applicants strengthen their proposals with professional guidance.

“I first submitted an NSF CAREER proposal in 2022, and it was rejected — I was full of self-doubt,” Krishnaswamy said. “But as part of the MU NSF CAREER Club, Christie Terry, director of professional development, was able to provide valuable insight based on the reviewer’s comments and encouraged me to try again. Christie is a patient listener and supported me throughout the submission process.”

Turning Corn Colorful

Corn is a quintessential American staple, but researchers at Mizzou are redefining its potential. Pavel Somavat, assistant professor of biological engineering, and USDA Research Geneticist Shery Flint-Garcia, along with their team, are studying colorful varieties of corn — especially the deep purple Maiz Morado. Together, they are uncovering its extraordinary nutritional value and diverse applications, including replacing synthetic food dyes, creating biodegradable packaging and serving as a natural pest repellent.

"The potential of non-yellow corn goes far beyond food," Somavat said. "With its unique health benefits and other applications, it offers a sustainable, high-value alternative for farmers and consumers alike. This is allowing us to rethink the role of corn in our future."

Shielding Against Foodborne Illness

Despite nationwide efforts, salmonella's infection rates have remained nearly unchanged for 30 years. The bacteria cause 1.3 million cases of foodborne illnesses annually.

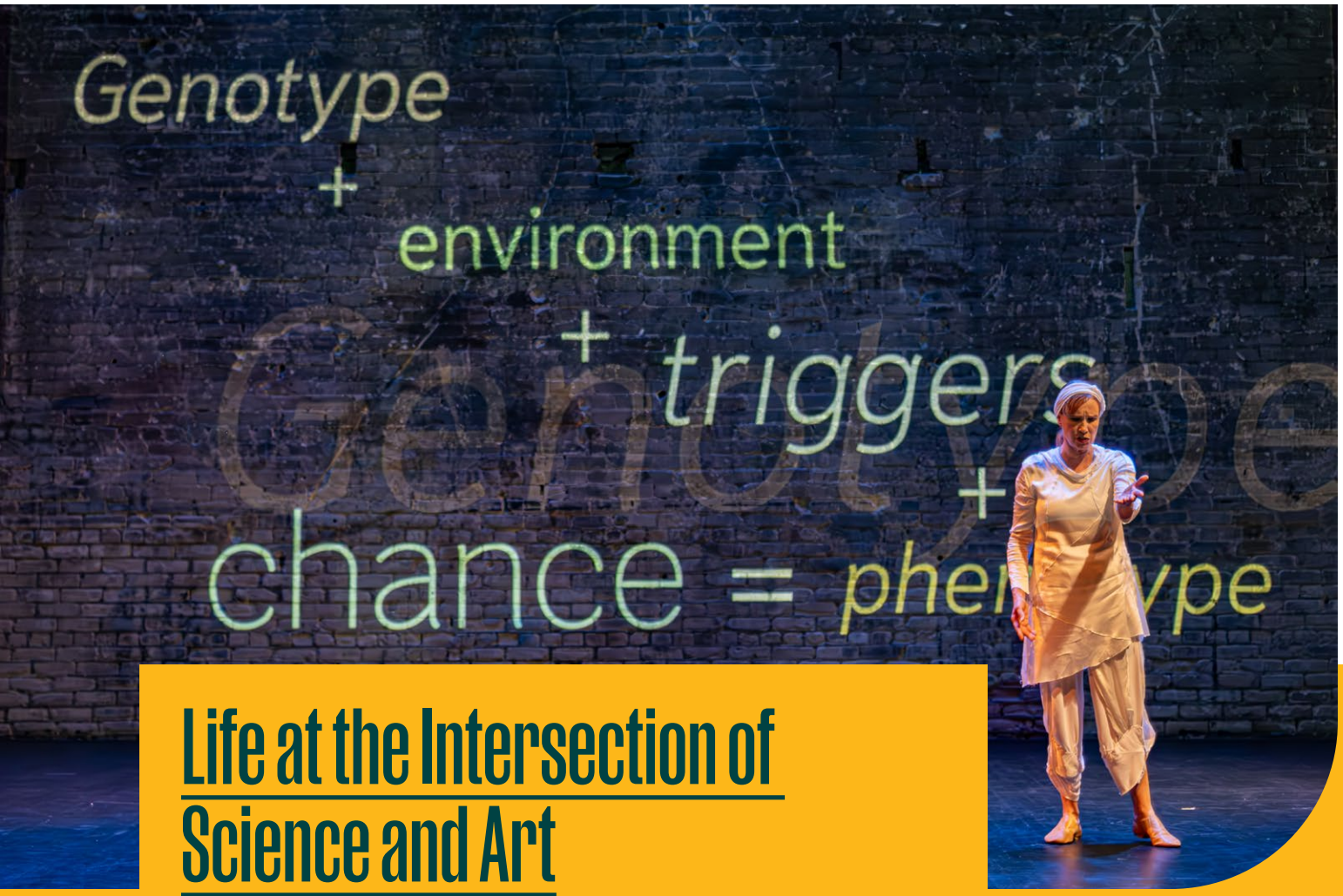
To combat this, a team of researchers from engineering, CAFNR and health sciences is developing new technology to rapidly detect and mitigate salmonella and other foodborne pathogens throughout the entire poultry supply chain.

"Real-time data collected from multiple portable sensors will be added to a transformative, sensor-enabled decision support system (SENS-D), allowing us to produce results in one hour or less," said Mahmoud Almsari, associate professor of electrical engineering and computer science. "Our rapid results will enable both the supply chain and health partners to make data-driven decisions to enhance food safety, equity and security by providing evidence-based solutions."

The project is funded by a $5 million grant from the NSF Convergence Accelerator program.

QUALITY OF LIFE

Where discovery meets humanity — improving how we live, learn and heal.



Life at the Intersection of Science and Art

Cherie Sampson, art professor in the College of Arts and Science, is redefining creative expression through an intermedia approach that merges performance, film and environmental installation. For years, her work has been deeply influenced by nature, spanning landscapes from Finland's boreal forests to Missouri's prairies. But in 2017, her artistic journey took a deeply personal turn when she was diagnosed with hereditary breast cancer.

Her one-woman performance, *every.single.one*, fuses documentary footage, movement and spoken word to explore the intersection of science, genetics and healing. Inspired by her own experience and the stories of other survivors, the show transforms personal trauma into a powerful act of resilience and connection. Through patient advocacy and artistic storytelling, Sampson not only raises awareness but fosters a sense of community among those affected by cancer.

"This performance validates the experiences of countless people who have endured similar experiences with illness and survival."

— Cherie Sampson

Testing Tomorrow's Treatments

Each year, Mizzou scientists run hundreds of clinical research studies and trials to test potential treatments and therapies that could improve human and animal health.

Clinical studies cover a broad spectrum, such as evaluating the safety and effectiveness of new drugs and medical devices, testing cognitive and physical functions and assessing nutrition and exercise interventions.

A study at Mizzou's Thompson Center for Autism and Neurodevelopment, for example, found that propranolol, a medication that treats high blood pressure, also can help lower anxiety for kids and young adults with autism spectrum disorder. David Beversdorf, a clinician at the Thompson Center, led the study, which involved 69 patients over a three-year span.

Animal patients also benefit from participating in clinical trials held by the College of Veterinary Medicine, such as a National Cancer Institute study of a promising immunotherapy for lymphoma. Sadie, a border collie mix from Jefferson City, has steadily improved since receiving treatments in the trial, and researchers hope their findings will someday help both animals and humans.

Brandon Boyd's Barbican Rhapsody

Since spring 2020, conductor, composer and pianist Brandon Boyd has booked an annual flight to Heathrow Airport. His destination? The illustrious concert hall at London's Barbican Centre. Once there, Boyd, an associate professor in the School of Music and the director of choral activities, joins forces with the London Symphony Orchestra (LSO) and more than 250 voices drawn from various corners of the London community.

Seated at the piano and guided by the baton of LSO Associate Conductor Andre J. Thomas, Boyd performs with this storied ensemble in a program featuring a composition he arranged, one that erupts with a heavenly choir and the full power of the orchestra. The combination roars through the iconic venue.

Boyd calls the notion of his songs coming to life at the 2,000-seat Barbican a singular thrill, describing it as "a gift from God that I can't help but to cherish. It's quite amazing to write or arrange something that starts as an idea and see how it transforms instrumentalists, singers and audiences, taking them to a place I never imagined."

Evidenced-Based Ways to Reduce School Bullying

Can teaching kids better social skills curb school bullying — and even prevent violence? Chad Rose and his team in the College of Education and Human Development were awarded $8 million from the U.S. Department of Education to test this theory.

One grant will study the effectiveness of the widely used Second Step Program, a social-emotional learning program for K-5 students. The other builds on previous research, training teachers to spot and stop bullying before it escalates. Rose, a national leader in bullying prevention, believes helping students increase social and communication skills — like self-awareness and responsible decision-making — are key to creating safer schools.

With bullying linked to increased aggression and school violence, these studies could reshape how schools approach prevention. “We want every student to feel safe at school,” Rose said. “That starts with teaching the right skills.”

Improving Long-Term Stroke Recovery

Surviving a stroke is just the first hurdle — thriving again afterward is the real challenge. Anna Boone, an assistant professor in the College of Health Sciences, secured $2.8 million from the National Institutes of Health (NIH) to research how to close the long-term care gap that leaves many stroke survivors with the chronic struggles of recovery.

Boone’s team will test a virtual self-management program with in-home sensors designed specifically for stroke survivors, comparing it to a general health program to see which is more effective in boosting confidence and participation in home, work and community activities.

USING AND UNDERSTANDING AI

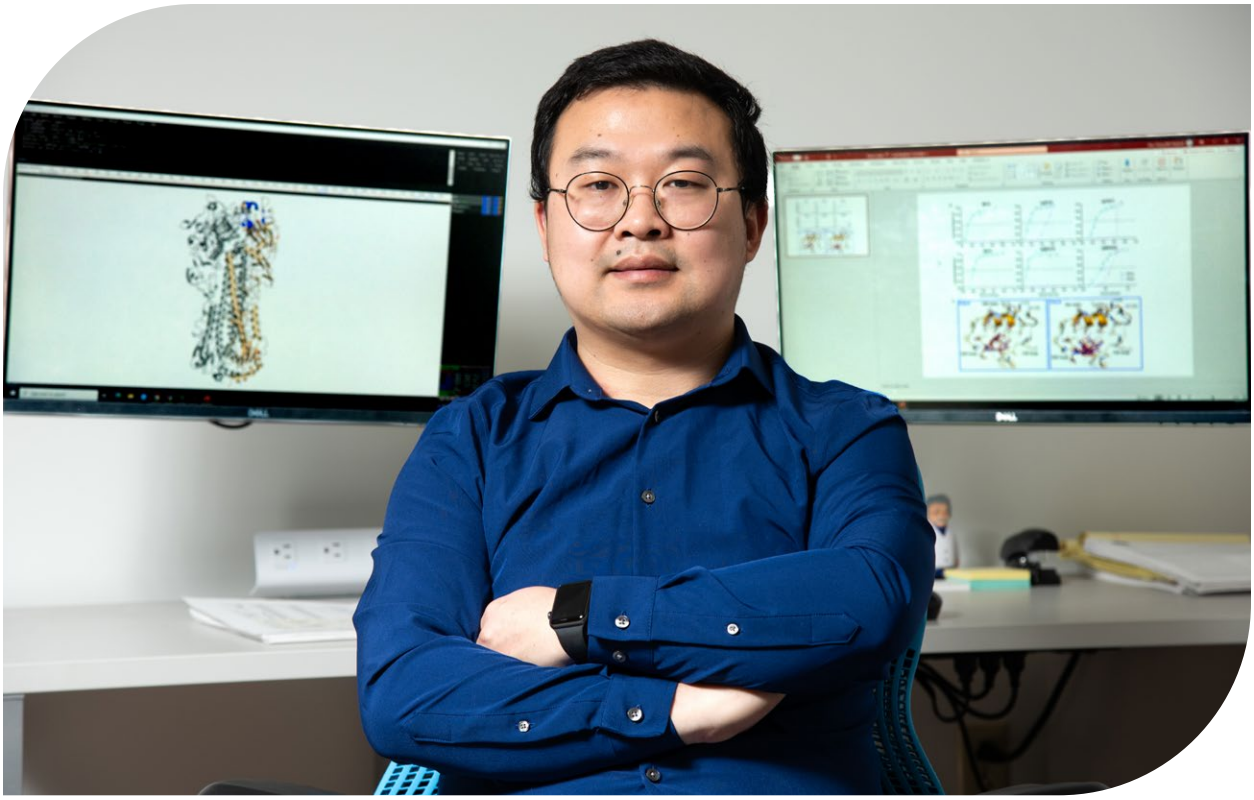
From forecasting flu seasons to boosting crop productivity, Mizzou researchers build smarter ways to solve complex problems.

A New Ag Tech Frontier

In a bold step toward the future of farming, Mizzou has launched the Digital Agriculture Research and Extension Center (DAREC) — a hub for cutting-edge research, education and outreach in agricultural technology. With nearly a third of Missouri's economy tied to agriculture, the center aims to equip farmers with data-driven strategies powered by artificial intelligence to optimize resource use and boost productivity.

From crop production and soil health to precision livestock farming, DAREC will serve as a launchpad for innovation in collaboration with MU Extension, USDA and industry partners. A key feature will be the MU Digital Farm, a demonstration site where real-world applications of smart ag tools will be tested and showcased.

By bridging research with hands-on training, DAREC hopes to ease the transition to digital farming and build confidence in tech adoption — ensuring that Missouri's farmers remain at the forefront of a rapidly evolving agricultural landscape.



Building Smarter Vaccines

Each year, scientists race against time to select the right flu strains for vaccines — a process that's slow, resource-heavy and vulnerable to viral mutations. Now, researchers at Mizzou's Bond Life Sciences Center, in collaboration with Mississippi State University, have developed *MAIVeSS*, a machine learning model that could revolutionize this timeline. Built by doctoral student Cheng Gao, the model quickly predicts the best vaccine candidates by analyzing a virus strain's antigenic match and production yield. Trained on extensive virological data — including custom-built virus variants — *MAIVeSS* offers accurate predictions in just days, cutting months from the traditional process. Currently tailored to the H1N1 flu strain, the model shows promise for adapting to other strains, streamlining vaccine development even further.

BALANCING INTELLECTUAL PROPERTY RIGHTS AND REGULATING AI

In a recent Missouri Law Review article, law professor Dennis Crouch in the School of Law explores how intellectual property (IP) law is both shaping and complicating the regulation of artificial intelligence. While IP protections like trade secrecy encourage innovation, they also can block public oversight of powerful AI systems, especially when those systems affect health, justice or civil rights. Crouch argues that relying on IP law alone won't address urgent concerns like algorithmic bias or lack of transparency. Instead, he calls for new regulatory approaches that balance innovation with accountability in an AI-driven world.

Cracking Protein Puzzles

Understanding how proteins work together is key to unlocking better treatments for diseases like cancer. Now, Jack Cheng, Curators' Distinguished Professor in the College of Engineering, is making that easier than ever. Cheng and his student, Nabin Giri, have developed Cryo2Struct, an AI-powered tool that builds 3D models of complex protein structures from cryo-electron microscopy (cryo-EM) images.

Published in Nature Communications, the tool automates what was once a painstaking, manual process, offering faster and more accurate insights into how proteins interact at the atomic level. This could help scientists design and optimize drugs to counter any faulty functions of a protein complex.

Mizzou's interdisciplinary resources helped make the breakthrough possible. Cheng is a researcher at NextGen Precision Health, where he has access to high-resolution Cryo-EM instruments at the Electron Microscopy core.

PREDICTING STOCK RETURNS

Finance Professor Kuntara Pukthuanthong in the Trulaske College of Business is harnessing AI to revolutionize investing — using models that interpret financial data like a movie reel, tracking how market narratives evolve over time to more accurately predict stock returns. Her research also introduces visual tools for comparing companies and reveals how media distortion influences investor behavior in today's fast-moving markets.

COMMUNICATORS AND AI

In new research from the School of Journalism, Professor Jon Stemmle found that strategic communicators are rapidly embracing generative AI — with usage jumping 21 percent and skepticism dropping — in just nine months. His findings reveal a shift from fear to enthusiasm, as professionals increasingly rely on AI for content creation and productivity, signaling a major transformation in the communication industry.

IMPROVING OUR ENVIRONMENT

Innovations for a cleaner, more sustainable world.

Removing Nanoplastics From Water

A team of Mizzou chemists have developed a liquid-based solution that removes more than 98 percent of nanoplastics from water, offering a potential solution to this growing environmental threat. Nanoplastics, which are invisible to the naked eye, pose risks to human health and aquatic ecosystems.

"Our strategy uses a small amount of designer solvent to absorb plastic particles from a large volume of water," said Gary Baker, associate professor of chemistry in the College of Arts and Science. The solvent, made from natural, water-repelling ingredients, captures nanoplastics and rises to the surface, allowing researchers to easily extract it — leaving behind clean water.

Recent alumna Piyuni Ishtaweera led the study while earning her doctorate in nano and materials chemistry at Mizzou. "These solvents are made from safe, non-toxic components, and their ability to repel water prevents additional contamination of water sources, making them a highly sustainable solution," she said.

Future studies will focus on scaling up the process for larger bodies of water.

"Our strategy uses a small amount of designer solvent to absorb plastic particles from a large volume of water."
— Gary Baker

Filtering Out Forever Chemicals

Researchers in the College of Engineering, led by Associate Professor Maria Fidalgo, have secured an Environmental Protection Agency (EPA) grant to develop a modular water treatment system targeting per- and polyfluoroalkyl substances (PFAS), or "forever chemicals." These persistent contaminants resist traditional removal methods, posing environmental and health risks. The team, including graduate student Gema Diaz Bukvic, has developed an innovative hybrid filter featuring an iron oxide-coated membrane that not only captures PFAS but also degrades them using low-cost, scalable technology.

Their system operates at low pressure and incorporates UV-LED light, ensuring energy efficiency and accessibility, particularly for rural communities. The filter is also unique due to its dual capability — adsorbing and breaking down PFAS, unlike conventional methods that merely trap them.

The team collaborates with Chung-Ho Lin, a research professor in CAFNR, who provides expertise in measuring contaminants at low concentrations.

"This work is really exciting because PFAS are a hot topic in the research community and there are a lot of people working on it," Fidalgo said. "When that happens, you feel like you're part of this community working toward a common goal to solve this big problem. And when something is so current, so pressing, it is very motivating to work on it."

"Understanding the interactions between PFAS and our membrane system is key to creating a technology that could be extended to other pollutants in the future."
— Gema Diaz Bukvic

Where Rubber Meets the Road

Roads made with rubber-based asphalt mixtures are proving to be more durable than traditional asphalt, and they're better for the environment by providing an effective way to recycle discarded tires.

But do they also help reduce greenhouse gas emissions? That's what researchers at the College of Engineering are now aiming to find out.

Bill Buttlar, Glen Barton Chair in Flexible Pavement Technology, was awarded a $1.2 million EPA grant to quantify the environmental impact of rubber-modified asphalt. This data will be used to create environmental product declarations for the recycled tire rubber industry, which could help the Federal Highway Administration incentivize industries to use these more sustainable solutions.

MOVING INDUSTRY FORWARD

Real-world solutions that strengthen sectors like journalism, education and corporate spaces.

Setting Up Middle School Teachers for Success

Keith Herman, Curators' Distinguished Professor in the College of Education and Human Development, and his team were awarded $4 million from the U.S. Department of Education to provide free online training and coaching on classroom management to 110 middle school teachers in rural Missouri. "If we can help teachers have more structured, predictable and positive interactions with their students, then the students should view their teachers more favorably and ultimately spend more time engaged and on-task." Herman said.

"If we can help teachers have more structured, predictable and positive interactions with their students, then the students should view their teachers more favorably."

— Keith Herman

Addressing Journalism Burnout

The Reynolds Journalism Institute (RJI) at the School of Journalism, in partnership with research firm SmithGeiger, conducted a study on burnout in the journalism industry. While 91 percent of respondents agreed with the statement "I love what I do," many respondents — 56 percent in southern regions — are generally pessimistic about the future of the industry. Journalists say hybrid work schedules; increased flexibility; and feeling seen, heard and appreciated by their management are factors that would improve their satisfaction with their work lives. Building on the results, RJI and SmithGeiger plan to work with newsrooms all over the country to turn the research into action through workshops, seminars and partnerships designed to tackle burnout head-on.

Hidden Cost of Bad Behavior by Executives

A new study from Adam Yore, associate professor of finance and the Stephen Furbacher Professor of Organizational Change at the Trulaske College of Business, reveals a surprising factor in corporate fraud — executives' personal ethics. Examining leaders with histories of dishonesty, affairs, substance abuse or violent tempers, Yore found a clear link between personal misconduct and corporate fraud, costing investors millions when scandals break. While auditors react to bad behavior with higher fees or dropped clients, they rarely act pre-emptively, especially for major firms. Published in The Accounting Review, Yore's research suggests corporate integrity starts at the top, and overlooking executives' personal values could be a costly mistake for companies and investors alike.

MIZZOU RESOURCES FOR INVESTIGATORS

Team Science

Mizzou fosters interdisciplinary research with its unique combination of medical, veterinary, law and nuclear research facilities on one campus. Despite this, forming cross-disciplinary collaborations can be challenging. To help, Mizzou's Division of Research offers Team Science events, which facilitate connections and interdisciplinary proposal development. These structured events help researchers engage with diverse perspectives.

"Team Science doesn't just combine different skills," said Christie Terry, the division's professional development director, "it's also about blending different ways of thinking. A biologist might see a problem through the lens of living systems, while an engineer might approach it from a design perspective, while a humanist may focus on ethical and social implications. When these perspectives converge, new ideas and solutions often emerge that would never have come to light in a more traditional, single-discipline approach."

The Professional Development team offers four types of Team Science events:

- **Connections Café** – For groups at the earliest stages of collaboration.
- **Inspiration Studio** – For groups ready to start developing ideas into a new, promising line of inquiry.
- **Proposal Acceleration Lab** – For groups who have identified a specific funding opportunity for which they'd like support in preparing a strong proposal.
- **Proposal Consultation** – For teams who need support on specific aspects of their proposal development.

"It's also about blending different ways of thinking. When these perspectives converge, new ideas and solutions often emerge that would never have come to light in a more traditional, single-discipline approach."
— Christie Terry

Team Science facilitators ensure productive discussions, handle logistics and provide followup support. By offering structured time for collaboration, Team Science helps researchers move beyond casual conversations and turn ideas into actionable projects.

Want to bring Team Science to your research group? Contact the professional development team at *muresearchprodev@missouri.edu*.

Learning to Lead

The Division of Research's Principal Investigator Leadership program is designed to help researchers lead teams well and avoid common pitfalls before they occur.

In graduate and postdoctoral programs, future researchers spend years learning hard science skills — the fundamental concepts of their field, research methods, data analysis and how to use high-powered lab equipment.

But what about "soft" skills, like how to successfully and effectively lead a team or manage a complicated long-term project? Most investigators aren't explicitly taught these concepts; they just learn as they go, building their leadership skills by trial-and-error as their career progresses.

The Division of Research human resources team noticed this pattern and tapped their professional development colleagues to create a leadership course specifically for principal investigators (PIs).

The program is intended to help PIs learn best practices and avoid common pitfalls in project management, meeting grant deliverables and team effectiveness through engaging exercises that are tailored to the research-enterprise experience.

Skylar King, a postdoctoral fellow studying molecular pathways that could be targeted for the prevention or treatment of cardiovascular diseases, recently went through the PI Leadership Program because her past training experiences in the lab have shown her how important effective mentorship and lab management are for successful research.

"I found the discussions regarding effective communication strategies to be very applicable," King said. "I learned that all teams have conflict, but most of the conflicts are a result of communication differences, unclear expectations, unreasonable time constraints and unclear performance standards."

Division of Research professional development staff members have conducted research themselves and understand the types of hang-ups that academics face when leading teams and writing proposals.

"The Professional Development team did a wonderful job," King said. "The team's enthusiasm and energy made the workshops fun, engaging, interactive and very informative."

Researchers interested in joining the next PI Leadership Program cohort can sign up to receive updates here: *mizzou.us/ProfessionalDevelopment*

WHERE RESEARCH AND PEOPLE MEET

Mizzou leads the Center for Advancing Research Impact in Society (ARIS), an NSF funded center that teaches scientists around the world how to bring their discoveries to the people who fund it and benefit from it.

The NSF defines broader impacts as the societal benefits of research, but Susan Renoe, Mizzou's associate vice chancellor for research development and strategic partnerships and executive director of ARIS, describes broader impacts as "where research meets people — the impact that research has, beyond academics, when it filters into communities and changes lives."

Continuously funded since 2013, the center received a $9 million injection in 2024 from the NSF to increase its focus on the scholarship of broader impacts while expanding the research ecosystem.

Expanding the knowledge base

Mizzou faculty bring discoveries and creative achievements into the classroom, lead national groups, attract millions of dollars in research grants and publish books and prestigious journal articles.

These activities expand our understanding of the world, keep faculty current on developments in their fields and ensure that students are equipped with the latest insights and skills for an evolving job market.

EXAMPLES OF BOOKS PUBLISHED IN 2024

- **"What Jane Knew: Anishinaabe Stories and American Imperialism, 1815-1845"** by Maureen Konkle, associate professor of English; published by The University of North Carolina Press — highlights the literary achievements of Jane Johnston Schoolcraft and 19th century struggles over the future of Indigenous people in the U.S.

- **"Dangerous Jokes: How Sexism and Racism Weaponize Humor"** by Claire Horisk, professor of philosophy; published by Oxford University Press — shows how humor makes jokes more potent than regular speech in communicating prejudice and reinforcing social hierarchies.

- **"An Introduction to News Product Management: Innovation for Newsrooms and Readers"** textbook by Damon Kiesow, Knight Chair in Journalism Innovation; published by Routledge — introduces students to human-centered design methods for managing news and advertising products.

- **"The structure of apolipoprotein B100 from human low-density lipoprotein,"** a study by Zachary Berndsen, assistant professor of biochemistry, and Keith Cassidy, assistant professor of physics; published in the journal Nature — details the discovery of a protein structure that could lead to more targeted heart disease treatments.

- **"A scaffold protein manages the biosynthesis of steroidal defense metabolites in plants,"** a study by Prashant Sonawane, assistant professor of biochemistry, and collaborators; published in the journal Science — identifies a scaffold protein that helps plants defend themselves from pests.

- **"The role of family relationships on adolescents' development and adjustment during the COVID-19 pandemic: A systematic review,"** by lead author Nicole Camione-Barr, professor of psychological sciences; published by the Journal of Research on Adolescence — details how the pandemic affected families in ways that were unprecedented.

- **"3 common archetypes of employees who commit fraud"** by co-author Vairam Arunachalam, PwC/Joseph A. Silvoso Distinguished Professor of Accountancy, was published in Harvard Business Review — provides practical information for business leaders to help prevent future losses.

Cultivating a Culture of Discovery

Mizzou has research centers that facilitate teamwork among investigators in different fields; train the next generation of scientists; and provide data, animal models and other services.

Integrating perspectives from numerous disciplines is crucial when researching complex problems like climate change, sustainable agriculture, neurodegenerative diseases and cancer. Innovation and creative thinking fostered at Mizzou's centers also give faculty a leg up when advancing their work and competing for external grant funding.

The Bond Life Sciences Center **celebrated 20 years of discovery** in 2024. The center has steadily grown its research expenditures since opening and saw grant obligations to its scientists increase from $11.9 million in 2018 to more than $41 million in 2023. Bond LSC is building off this strength, adding six principal investigators since 2021 thanks to the **MizzouForward initiative**.

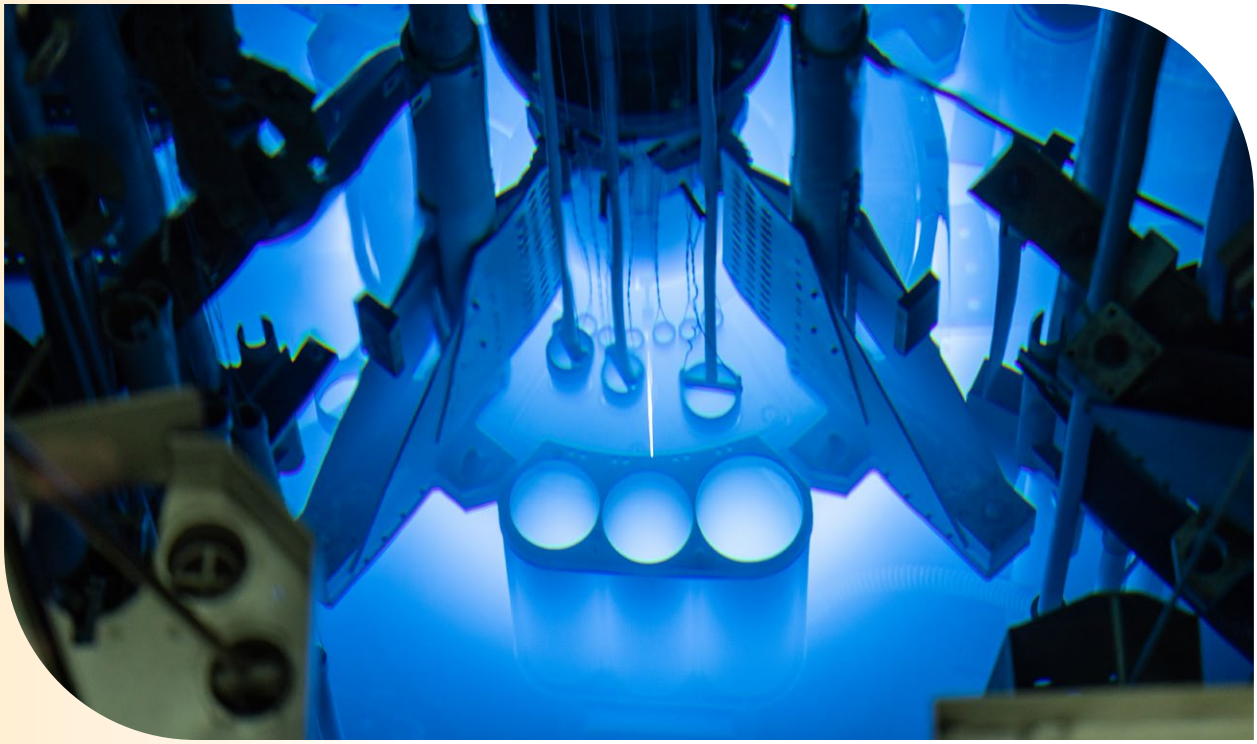
The university also is making major strides in precision health research, in pursuit of better personalized care options and shortening the time it takes for a new drug, device or breakthrough to reach patients. It's part of the statewide NextGen Precision Health Initiative, with a mission to catalyze new collaborations, engage the community and strengthen the region's scientific workforce.

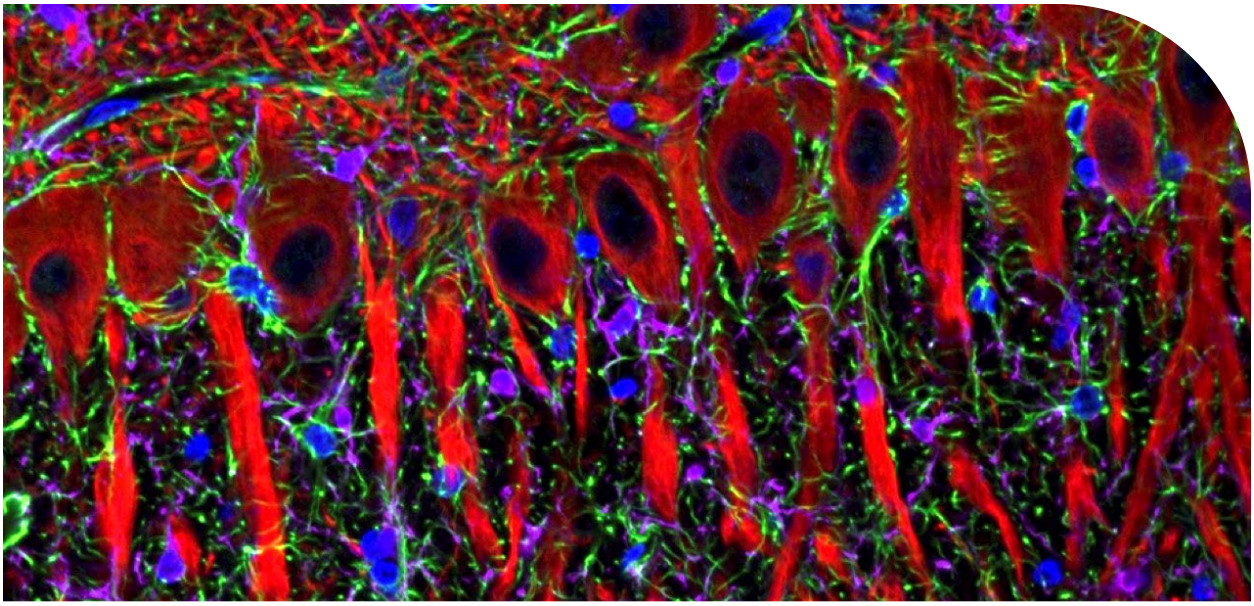
Much of this work is being done by investigators at the **Roy Blunt NextGen Precision Health building** at Mizzou, which attracted $222.6 million in grants over a three-year period from its grand opening in October 2021 until November 2024. Lab clusters in the center focus on AI and data science, biomaterials engineering, cancer and immunology, cardiovascular and metabolic disorders, imaging, neuroscience and reproductive biology.

In addition, the **University of Missouri Research Reactor** (MURR) continues paving the way for an expansion of precision medical isotope production to meet an increasing global demand. MURR is the only U.S. producer of multiple critical radioisotopes used in the treatment of more than a dozen types of cancer, including liver, thyroid, pancreatic and prostate cancers. In FY24, the university broke ground on a $20 million addition to expand production space and testing laboratories and laid the groundwork for NextGen MURR, a transformative initiative to build a new, state-of-the-art reactor.

MAJOR HUBS FOR INTERDISCIPLINARY RESEARCH

- Christopher S. Bond Life Sciences Center
- Dalton Cardiovascular Research Center
- Interdisciplinary Plant Group
- Materials Science and Engineering Institute
- Metagenomics Center
- Missouri Prevention Science Institute
- Missouri Center for Addiction Research and Engagement (MO-CARE)
- Molecular Imaging and Theranostics Center
- MU Research Data Center
- MU Research Reactor
- Mutant Mouse Resource and Research Center
- National Swine Resource and Research Center
- NextGen Center for Influenza and Emerging Infectious Diseases
- NextGen Precision Health initiative
- Roy Blunt NextGen Precision Health building
- Rat Resource and Research Center
- Thompson Center for Autism and Neurodevelopment





Maximizing Mizzou's Research Capabilities

In FY2024, the Division of Research invested $3.6 million in new state-of-the-art instruments, equipment and other support for advanced technology core facilities.

These centralized resources empower researchers across disciplines by providing shared access to high-end instruments, specialized technologies, training and expertise that go beyond what individual labs and campus units can offer.

The Advanced Light Microscopy Core (ALMC) is a good example of the university's focus on infrastructure growth for high-caliber research. More than 230 investigators from 100 labs use the facility annually to visualize and document objects, materials and structures undetectable by the naked eye. Last year, the ALMC received four new, major instruments thanks to the MizzouForward initiative, campus departments, grants and other funding.

The cores, which operate on a fee-for-service basis, also help researchers from other academic institutions and industry reach their scientific goals.

DIVISION OF RESEARCH CORES

- Advanced Light Microscopy
- Animal Modeling
- Bioinformatics and Analytics
- Cognitive Neuroscience Systems
- Electron Microscopy
- Flow Cytometry
- Gehrke Proteomics Center
- Genomics Technology
- Laboratory for Infectious Disease Research
- Metabolomics Center
- Molecular Interactions
- PET Imaging Center
- Small Animal Phenotyping

Hatching Products and Ventures

Mizzou research often leads to new technologies, tools, therapeutics, diagnostics and other innovations that can make a difference in people's lives. However, translating academic discoveries into real-world solutions and viable businesses is challenging to navigate without training and support.

Faculty from any discipline can tap a rich variety of commercialization and business-building resources at Mizzou, including those associated with a new $5.5 million **Accelerating Research Translation award** received from NSF in FY24.

Principal investigator Sheila Grant, professor of biological and biomedical engineering, is using the NSF grant to support the **Mizzou TecHub**, which provides training, mentoring, wrap-around support and funding opportunities for students, faculty and staff. It is one of several campus accelerators and incubators that offer get-to-market assistance.

Another key resource are experts in the **Technology Advancement** office who evaluate inventions for novelty, utility and market potential. In FY24, Mizzou researchers disclosed 90 new inventions and received 20 U.S. patents.

An invention with a patent, copyright, trademark or other protection is usually an incentive for an industry partner to invest in commercializing it. In fact, external partners paid $16.8 million in FY24 to license and further develop university technologies.

For example, the Erler-Zimmer company in Germany licensed and sells a hyper-realistic IV training arm for students in medical professions designed by Damon Coyle, simulation innovation specialist at the Russell D. and Mary B. Shelden Clinical Simulation Center. Tech transfer experts also executed the university's first-ever nut tree license agreement for UMCA® PQK Chestnuts developed by Ron Revord, assistant research professor, and others in Mizzou's Center for Agroforestry

These innovations and many others have helped the University of Missouri System regularly rank among the National Academy of Inventors' **top 100 U.S. universities** granted U.S. utility patents.

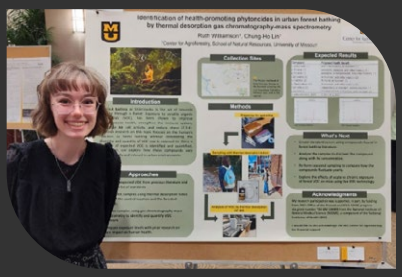
Mizzou Students Discover More

Show Me Research Week

In April 2024, more than 500 Mizzou students presented a research project or creative work during Show Me Research Week, Mizzou's primary student-centered interdisciplinary research event. Beyond student presentations, the week featured keynote speakers, life sciences exhibits, an inclusive fashion display, art showcases, faculty panels, professional development opportunities and more.

What sets this week apart is the coming together of just about every discipline on campus — a student who studied the effects of school lunch funding on education outcomes could be presenting next to someone whose project deals with the intricacies of the COVID-19 virus.

"Show Me Research week was a great low-pressure environment to learn how to communicate my research," said Ruth Williamson, a junior studying plant sciences. "It made me think through how to talk about my research so others not in my field could understand. I also had a great time hearing about research from other departments looking into topics I hadn't ever thought about!"



↑ Ruth Williamson presents her poster on urban forest bathing.

Rooted in Research

Lara Stefani, a sophomore, has long been passionate about the intersection of chemistry, plants and human health. Growing up in São Paulo, Brazil, she struggled with chronic asthma and became frustrated with pharmaceutical treatments' side effects. Her search for alternatives led her to Guaco, a Brazilian plant known for its anti-inflammatory properties, sparking a curiosity about plant-based medicine.

Through her high school's dual diploma program with Mizzou Academy, which helps integrate Brazilian and U.S. curriculum and prepares students for success both in college and in their careers, she heard of study abroad and research opportunities at Mizzou. A few years later, Stefani arrived in Columbia, where she has thrived as an undergraduate investigator.

Through the Undergraduate Research Internship at CAFNR, Stefani has expanded her research beyond Guaco, now focusing on the potential of elderberries and soybeans to treat polycystic ovary syndrome. "I came to Mizzou because I wanted to be able to do something meaningful," she said. "It's important to me to contribute to the scientific community and help find treatments for diseases that affect millions of people."

Her dedication earned her the Best Undergraduate Student Poster award at the Metabolomics Association of North America annual conference. Looking ahead, Stefani hopes to develop plant-based treatments accessible to people worldwide. "With Mizzou's support, I hope this research will soon provide practical solutions for Missourians experiencing these diseases."

"I came to Mizzou because I wanted to be able to do something meaningful. It's important to me to contribute to the scientific community and help find treatments for diseases that affect millions of people."

— Lara Stefani

DIVE INTO DISCOVERY

Mizzou's Office of Undergraduate Research has resources to get students on the path to discovery as soon as they set foot foot onto campus as a freshmen. The office hosts the Student Training for Advancing Research (S.T.A.R.) Program — a series of workshops designed to help them:

- Become familiar with how the research world works.
- Develop professional research skills.
- Find a faculty mentor.
- Learn how to present research to different audiences.

Learn more at:
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