

The University of Texas at Dallas | School of Natural Sciences and Mathematics

# NSM LENS

Cancer  
Researcher  
Fulfills  
Promise

2022

Research Robots Deliver Data  
Safely and Quickly

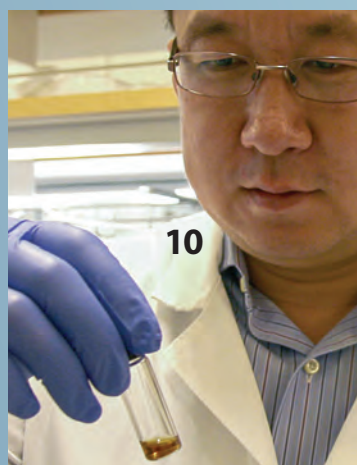
Fighting Cancer  
on All Fronts





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# NSM LENS

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Hello!

I recently celebrated my first anniversary at UT Dallas as dean of this remarkable School of Natural Sciences and Mathematics, and what a year it has been! I am happy to report that the school is in great shape despite the challenges faced because of the pandemic.

We are enjoying growth in enrollment of freshmen and in research revenue. Our faculty have received several notable awards and recognitions, motivating us to significantly increase hiring of exceptional and diverse faculty. Our school's research grant portfolio is surging – up more than 20 percent for the first quarter of 2022 when compared with the same period last year.

There are many people to thank for this bright outlook: our professors, who are the engines that drive this institution; our staff, who make it all work; our alumni, who continue to give back in so many ways; and, of course, our students.

Our faculty members are providing the scientific and mathematical advances that inform responsible policies and practices going forward. In research, teaching, and in service, I see our school playing an important role as we continue to better understand how human activities impact the planet.

As I continue to build my leadership team, we plan in the coming year to hire new staff to help our faculty continue to grow their research programs and to connect our students with internships across the DFW region and beyond.

This inaugural issue of *NSM Lens*, the magazine of the School of Natural Sciences and Mathematics, aims to deliver a broad view of some achievements from the last year. For example, several researchers within the school contribute to the fight against cancer, including biologists Dr. Nikki Delk, Dr. Li Zhang, and newcomer Dr. Purna Joshi, who are identifying triggers that cause cancer cells to proliferate and are finding ways to suppress them. In mathematical sciences, Dr. Swati Biswas and Dr. Pankaj Choudhary developed an online tool to help Black breast-cancer survivors assess their risk of getting a second breast cancer. And in chemistry and biochemistry, Dr. Jie Zheng is using nanoparticles to develop better imaging techniques for kidney cancers.

Our Department of Science/Mathematics Education has been an outstanding resource for educators and education, recognized by the Texas Education Agency for producing highly qualified — and urgently needed — STEM teachers. This issue features one faculty member's innovation in establishing a summer institute to show Texas teachers how to use zebrafish in their science classrooms.

We also highlight our distinguished alumni and donors who make outstanding contributions across a range of industries and diligently invest in our school. Please enjoy this inaugural issue of *NSM Lens* and thank you for your support of the school's exciting future.

Sincerely,

*David Hyndman*

Dean, School of Natural Sciences and Mathematics  
Francis S. and Maurine G. Johnson Distinguished University Chair  
Professor of Geosciences

# School Names Two New Department Heads

**Dr. David Lumley**, the Cecil H. and Ida M. Green Chair in Geophysics, has been named head of the Department of Geosciences. Dean David Hyndman made the announcement last summer.

Lumley, who joined UT Dallas in 2017, said he intends to grow the geosciences faculty with a new emphasis on sustainable Earth systems science.

"Many of today's challenges relate to climate change and providing natural resources such as clean energy, strategic minerals and water in a manner that is both sustainable and protects the environment," he said. "I aim to shape the department with this 'sustainable Earth sciences' vision, and its natural links to fundamental Earth science research."

Hyndman also named **Dr. Mihaela Stefan**, Eugene McDermott Professor, head of the Department of Chemistry and Biochemistry.

In addition to being named department head, she received the 2021 Wilfred T. Doherty Award from the American Chemical Society's Dallas-Fort Worth section. The award recognizes excellence in chemical research, chemistry teaching or meritorious service to the American Chemical Society.

Stefan joined UT Dallas in 2007.

## NSM Department Heads



**David Lumley**  
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# Grants and Research



## Professor's NIH Grant Fuels Probe of Molecule Synthesis Methods

**Dr. Vladimir Gevorgyan**, the Robert A. Welch Distinguished Chair in Chemistry, recently was awarded funding from the National Institutes of Health (NIH) to investigate transition metal-radical-hybrid methods for organic synthesis. The grant totals \$1.2 million over the next three years.

Gevorgyan's research focuses on developing new methods to synthesize molecules that are valuable building blocks in synthetic organic chemistry and materials science and are of pharmaceutical relevance.

According to Dr. Mihaela Stefan, head of the Department of Chemistry and Biochemistry, Gevorgyan's work is of great importance in the field of organic chemistry. His novel methodologies will help create more sustainable synthetic tools for medicinal chemistry.

"By focusing on improving in-lab methodologies, Vlad is placing an emphasis on sustainability and reducing the industry's carbon footprint, which gains in importance by the hour," Stefan said.

Research in Gevorgyan's lab aims to develop and understand new chemical processes from which tools that are more powerful, more selective and more environmentally safe can be created, then used in a variety of new fields.

## Welch Foundation Recognizes Four Chemistry Faculty Members

Faculty members at The University of Texas at Dallas received four of the 94 research grants recently awarded statewide by The Welch Foundation, one of the nation's largest sources of private funding for basic chemical research.

The foundation's 2021 funding included nearly \$23 million to 15 Texas colleges and universities. Each of the UT Dallas grant recipients — all of them in the Department of Chemistry and Biochemistry in the School of Natural Sciences and Mathematics — will receive up to \$240,000 over three years.

"Chemistry has a long history of support from The Welch Foundation, but four new grants is unprecedented and speaks to the quality of our faculty," said Dr. Kenneth Balkus, professor of chemistry whose own research is supported in part by the foundation. "In particular, our young faculty have established a strong record of funding, and this recognition by The Welch Foundation further validates their research efforts."

With this addition, UTD faculty hold 13 active Welch Foundation research grants.

Since its inception in 1954, the Houston-based foundation has contributed nearly \$1.1 billion to the advancement of chemistry through research grants, departmental grants, endowed chairs and support for other chemistry-related programs in Texas.

"Ongoing basic chemical research is critical and provides the building blocks to help solve current and future problems," said Adam Kuspa, president of the foundation. "Funding from The Welch Foundation is a valuable resource to Texas institutions. It helps set our state's researchers apart from others, and we look forward to seeing what invaluable scientific contributions come from this year's grant recipients."

## 2021 Welch Grant Recipients at UT Dallas



**Dr. Sheena D'arcy**  
associate professor of chemistry and biochemistry - "A Novel HDX Workflow To Study Histone Dynamics in Multi-Nucleosome Systems"



**Dr. Sheel Dodani BS'07**  
associate professor of chemistry and biochemistry - "Harnessing the Plasticity of Anion-Binding Proteins To Engineer Genetically Encoded Fluorescent Indicators and Integrators"



**Dr. Gabriele Meloni**  
associate professor of chemistry and biochemistry - "Assembly, Selectivity, Structure, Metalloaromaticity and Reactivity in Protein Metal-Thiolate Clusters"



**Dr. Allison Stelling**  
assistant professor of chemistry and biochemistry - "Development and Application of IR-Based Methods for Detecting A-T Hoogsteen Base Pairs in the Nucleosome"

# Community Spotlight

## Zebrafish Help Spark Schoolkids' Imaginations

A program at UTD is helping teachers spark curiosity and provide real-world applications to scientific concepts via a small addition to their classrooms — zebrafish.

**Dr. Vinita Hajeri**, assistant professor of instruction in the Department of Science/Mathematics Education in the School of Natural Sciences and Mathematics, started the Zebrafish Summer Institute in 2018 to give kindergarten through 12th-grade teachers a low-cost method to drive home science lessons with their students.

"During my postdoctoral training with zebrafish at UT Southwestern Medical Center, I was very active in doing outreach with schoolchildren," Hajeri said. "I realized the kids get really excited with zebrafish, but I wasn't leaving the teachers with a model to continue using the fish in their lessons."

Zebrafish are at the forefront of biological research, helping scientists understand complex diseases, including cancer. According to the National Institutes of Health, 70% of human genes are found in these fish. Recently, UT Southwestern researchers developed a zebrafish model for the childhood cancer rhabdomyosarcoma.

Zebrafish also are ideal for classrooms: They are freshwater fish that can be found at local pet stores; they can be easily maintained in a classroom aquarium; students can practice several scientific concepts while studying them — from collecting data and monitoring the tank habitat, to developing hypotheses and writing about their findings.

"Working with zebrafish allows students to conduct experiments at minimal costs, such as investigating patterns of vertebrate embryonic development and identifying commonalities shared between human and zebrafish embryos," Hajeri said.

The institute — which typically lasts a week and collaborates with the Science Teacher Access to Resources at Southwestern [STARS] program at UT Southwestern and faculty at UT Arlington — returned to in-person instruction this summer. Teachers from across the DFW metroplex attended the program.



From left: UTeach Dallas Associate Director and Master Teacher Katie Donaldson, MAT'93; Clinical Assistant Professor/Master Teacher Kate York, PhD; and Assistant Professor of Instruction and Graduate Advisor Emily Hennessey, MAT'09, host a booth during the annual Conference for Advancement of Science Teaching.

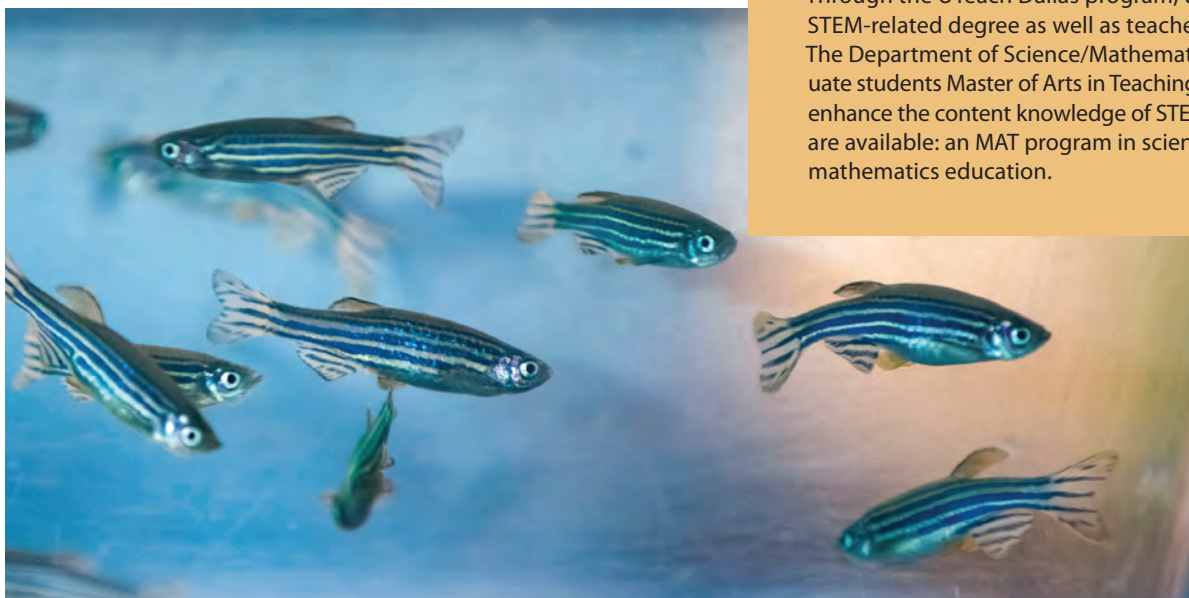
## Teacher Training Program Recognized

The UTeach Dallas program in the Department of Science/Mathematics Education received commendation from the Texas Education Agency (TEA) last year for effectively addressing the science, technology, engineering, and mathematics (STEM) teacher shortage in the state, specifically citing the program's production of mathematics teachers.

"The UTeach Dallas program itself was created to fill those needs. That's our mission, that's our goal," said Dr. Mary Urquhart, head of the department and director of the UTeach Dallas program.

"The commendation is the state's way of saying that we are meeting our mission as a STEM institution and are serving the community by fulfilling this desperate need in our state for mathematics teachers," she said.

Through the UTeach Dallas program, undergraduates can earn their STEM-related degree as well as teacher certification in four years. The Department of Science/Mathematics Education also offers graduate students Master of Arts in Teaching (MAT) programs designed to enhance the content knowledge of STEM teachers. Two concentrations are available: an MAT program in science education and an MAT in mathematics education.







# *Cancer Researcher Fulfills Promise*

When her beloved grandmother died of brain cancer, nine-year-old Nikki (pronounced niKEE) Delk made a promise to become a scientist and to help find a cure.

**Dr. Nikki Delk**, who went on to serve in the U.S. Air Force and earn her doctoral degree in biology from Rice University, was hired as an assistant professor in the biological sciences department in the School of Natural Sciences and Mathematics at UT Dallas in 2014.

Now she is an associate professor and Cecil H. and Ida Green Professor in Systems Biology. Her research focus: The role of inflammation in breast and prostate cancer progression and treatment resistance.

Delk's career path demonstrates both her drive and perseverance. Although she knew she wanted to help find a cancer cure, she was not sure how she would get there because she did not have examples of scientists, especially Black female scientists, to follow.

Delk was awarded an Air Force ROTC scholarship to pay for her undergraduate education at Georgetown University, where she majored in mathematics and minored in physics.

"In my family, education has always been very important. This was especially instilled in my family by my great grandmother," Delk said.

"At her 100th birthday party, when I sat next to her, she looked at me and asked, 'How much schoolin' do you have?' At the time I was working on my doctorate, and she began to tell me about her time as a schoolteacher. It was clear from her tone that being a schoolteacher was a strong source of pride. But in her era, as a woman, and as a

Black woman, growing up in the Jim Crow south, she was forced to give up her career to be a wife and mother."

"So, she imprinted on our family that education is the means to independence and freedom."

Delk's service in the Air Force is what brought her to Texas.

"Of all the places in the world I could have been assigned, I was stationed at Brooks Air Force Base in San Antonio at the Air Force Research Lab (AFRL). I knew that it was God saying, 'OK, I remember you said at nine years old you wanted to be a cancer researcher.' It would be a turning point in my career path," Delk said.

Although she was not a scientist in the Air Force – she was a contracts and program manager with AFRL – Delk was surrounded by doctors, biomedical scientists, biologists and chemists.

"It's in my nature to ask a lot of questions, so I asked – 'What do you do? How did you get to where you are? What kind of education do you need to do what you're doing?' I appreciate the mentoring I received at AFRL, and after fulfilling my ROTC scholarship commitment, I separated from the military to pursue my doctorate in biological sciences at Rice University."

Delk credits her forebearers for creating a path for fulfilling her promise to her 9-year-old self and to her grandmother to help cure cancer.

"My great-grandparents and grandparents grew up in the Jim Crow era and my mom, aunt and uncle grew up during the Civil Rights era living through segregation and desegregation," Delk said.



**Far left:** Dr. Nikki Delk's uncle and aunt, Michael Edwards and Deborah Hampton, congratulate her following her 2018 investiture ceremony at UT Dallas.

**Top:** Jean Edwards, Dr. Delk's grandmother.

**Bottom:** Dr. Delk's mom, Anita Edwards Alexander, supported her daughter when she received her PhD in biology at Rice University.

"Their experiences shaped my perspective and also paved a way for my success as an African American woman in a country rooted in systemic racism. Because of their boldness, fearlessness and love for me, I grew up with a sense of confidence and the audacity to know that being an African American woman is something to be proud of and an asset.

"If there have been obstacles in my career path because of my race or gender, I have always been too focused on achieving to let anyone or anything stop me. But I have the luxury of my unencumbered focus because of those before me — and those still today — who recognized the need for diversity in STEM and worked hard to establish and implement programs that recruit and retain underrepresented minorities and women into STEM."

At Rice, Delk was awarded an Alliances for Graduate Education and Professoriate fellowship, a National Science Foundation program designed to recruit and retain underrepresented minorities through financial support and mentorship.

"Being a part of AGEP at Rice was being part of a family with shared experiences and backgrounds. It was a wonderful part of my life in graduate school and an integral part of my success," Delk said.

"I am a successful product of what these programs were designed for — to address and correct underrepresentation in STEM by ensuring people like me have opportunities afforded others. When we widen the pool, it serves to benefit the field because we increase the number of brilliant minds and perspectives working toward a common goal to contribute to society through science."



## Delk Lab Unveils Inflammation's Role in Prostate, Breast Cancers

Like a sleuth following a trail of clues, biologist Dr. Nikki Delk reviews the evidence. She is closing in on a killer.

But this one is wily, often executing a breathtaking, last-second escape when cornered.

According to the American Cancer Society, breast and prostate cancer are the most diagnosed cancer type in U.S. women and men, respectively, and the second-leading cause of cancer deaths in those groups. They also are the target of Delk's investigation.

"My lab studies the role of inflammation in breast and prostate cancer progression and treatment resistance," said Delk, associate professor of biological sciences and Cecil H. and Ida Green Professor in Systems Biology Science at UT Dallas.

Her team has made a number of discoveries.

"Our research is focused on an inflammatory protein called interleukin-1 [IL-1], a cytokine that affects hormone receptors," Delk said. "Hormone receptors, like estrogen, progesterone and androgen receptors, are what promote the growth and proliferation of breast and prostate cancer cells.

"We found that acute exposure to IL-1 prevents the gene expression and accumulation of these hormone receptors. At first glance, this is good, because IL-1 kills the cancer cell by ridding its hormone receptors.

"However, we also discovered that the cancer cells can circumvent death by eliciting compensatory survival pathways that are also induced by acute IL-1 exposure. Furthermore, we discovered that if the cancer cells are exposed to IL-1 chronically, or long term, the cancer cells evolve resistance to IL-1 and restore their hormone receptors. During this evolution, the cancer cells also acquire other proteins that may make the cancer cells more aggressive. We are currently studying the consequences of this cancer cell evolution in my lab," Delk said.



# Fighting Cancer on All Fronts

*Throughout the School of Natural Sciences and Mathematics, researchers are developing new approaches to help improve the detection, diagnosis and treatment of cancer. From understanding the basic biology of cancer cells to developing more accurate imaging technology and screening tools, faculty members are fighting the war on cancer on multiple fronts.*



## Statistical Model Helps Predict Black Survivors' Risk for Second Breast Cancer

Statisticians in the School of Natural Sciences and Mathematics developed an online tool a few years ago to help breast cancer patients assess their risk of developing a second breast cancer. The tool was externally validated and is in clinical use, providing additional guidance for patients and their doctors in the timely management of the disease.

**Dr. Swati Biswas**, professor of statistics in the Department of Mathematical Sciences, has spent a major part of her career working on statistical models that shed light on who is most at risk for developing breast cancer. While her tool initially was developed based on the U.S. general population, Biswas said it is important to have a version specifically tailored toward Black breast cancer survivors.

"We have developed a more personalized tool for Black women, as they are at higher risk of getting breast cancer than whites," Biswas said. She collaborated with Dr. Pankaj Choudhary, professor of statistics, to tweak the

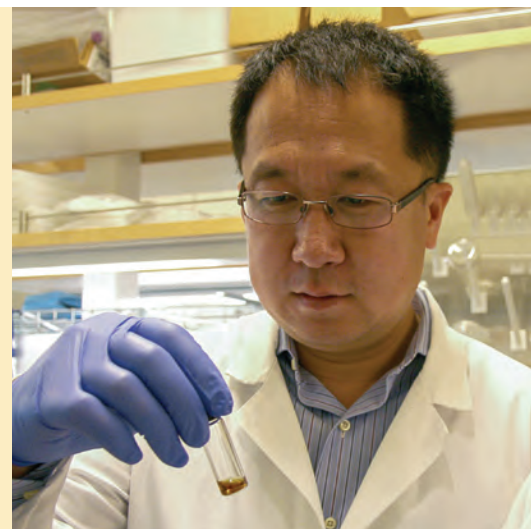
assessment tool to better provide Black breast cancer survivors with their future risk of developing contralateral breast cancer — cancer in the other, healthy breast.

Biswas and Choudhary described the improvements in their research paper published in the journal *Breast Cancer Research and Treatment*. A statistics doctoral student, Ibrahim Hossain Sajal, is the first author of the work.

"We believe this is a step toward achieving racial equity in risk prediction for contralateral breast cancer," Choudhary said.

According to the American Cancer Society, as of 2019, breast cancer became the leading cause of cancer death for Black women.

"The importance of statistics sometimes becomes obscure to the public. People think, 'Oh, that's math, what's the use?'" Biswas said. "But this project really shows the important role mathematics and statistics play in areas vital to our everyday lives."



## Getting a Better View: Improvements in Imaging

**Dr. Jie Zheng**, professor of chemistry and biochemistry and the Cecil H. and Ida Green Professor in Systems Biology Science, is dedicated to increasing fundamental understanding of physiology on the nanoscale and developing innovative diagnostics and treatments for cancer and kidney and liver diseases.

"As a silent killer, kidney disease affects more than 10% of the U.S. population and causes more deaths than breast and prostate cancers combined," said Zheng, who is also an adjunct professor of urology at UT Southwestern Medical Center. "By studying nanoparticle transport and interactions in the kidneys, we are developing highly sensitive and low-cost imaging techniques for early diagnosis of kidney injuries — before the elevation of biomarkers currently used in the clinics — so that early treatment and better efficacy can be achieved."

Zheng's goal is to advance both CT and fluorescence imaging of kidney cancers with an innovative nanotechnology that can help surgeons more accurately identify tumor margins and precisely remove cancerous tissues — with minimal damage to normal kidney tissues and functions — to significantly improve quality of life for cancer patients. In addition, his team is also developing novel nanomedicines and drug-delivery systems that can enhance the therapeutic efficacy of chemotherapy for cancer while minimizing side effects of treatment.

## Scientists' Engineered Protein Slows Lung Cancer Growth

More Americans die from lung cancer every year than breast, pancreatic and colorectal cancers combined, according to the American Cancer Society.

**Dr. Li Zhang**, professor of biological sciences, and her research team have found that cells of the most common type of lung cancer – non-small cell lung cancer – consume significantly more oxygen than healthy cells. The lung cancer cells outpace their healthy counterparts in synthesizing and importing a critical chemical called heme, which helps transport and store oxygen. The elevated levels of oxygen and heme fuel tumor growth and progression.

Last year Zhang, the Cecil H. and Ida Green Distinguished Chair in Systems

Biology Science, was awarded her second \$900,000 grant from the Cancer Prevention and Research Institute of Texas to further her investigation. Currently, she is using advanced imaging techniques on animal models to determine whether drugs that target heme synthesis and uptake can be used to suppress lung tumors, improving the effectiveness of chemotherapy, radiotherapy and immunotherapy. She also has cofounded a company with two UTD students, twins Pouya and Parsa Modareszadeh, called HemePro Therapeutics, which aims to turn heme-sequestering peptides and proteins into cancer-fighting drugs.



Recent doctoral graduates Sagar Sohoni (left) and Poorva Ghosh (right) worked with Dr. Li Zhang (center) on a study that shows that the expansion of lung tumors slowed when access to heme – the oxygen-binding molecule in hemoglobin – was restricted.



## Unraveling the Role of Stem Cells in Breast Cancer

A new Department of Biological Sciences laboratory is focused on unraveling the role of stem cells in breast cancer to enable the development of innovative screening tools and therapeutic interventions.

Stem cells, and their daughter cells called progenitors, have special properties that allow them to self-renew, divide and differentiate with varying potency into mature cell types present in tissues.

"There are multiple steps and factors that orchestrate the transformation of a cell into a cancer cell," said **Dr. Purna Joshi**, assistant professor of biological sciences. "A stem cell or a progenitor already has the advantage of being able to proliferate and generate distinct cell types, making it a susceptible target for cancer development.

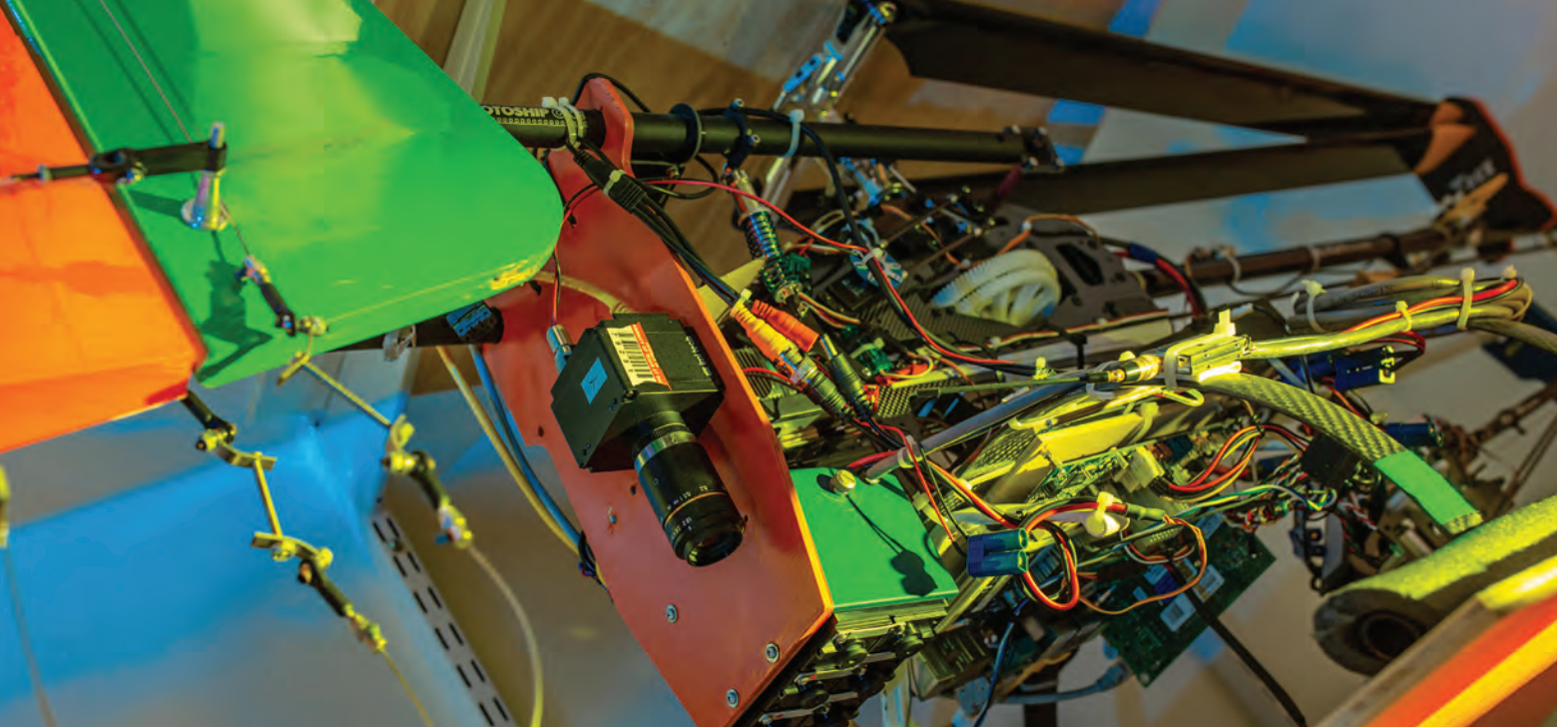
"In addition to the properties of the target cell, multiple mutations or 'hits' are required, and host factors such as reproductive history, hormone exposure, obesity, diabetes as well as environmental toxins may contribute to fueling the emergence of a cancer cell," she said.

Joshi studies stem/progenitor cells in the epithelial portion of the breast where cancer is detected. Epithelial cells, however, are not the only cells in the mammary gland, and several other cell types may influence cancer growth.

In particular, she said she wants to understand the existence and significance of immature cells within the microenvironment of the mammary gland.

"In my lab, we identified a unique stromal progenitor that gives rise to epithelial cells during hormone-driven growth of mammary tissue, opening a new avenue for probing its involvement in cancer development and/or progression," she said.





# Robots Deliver Data Safely and Quickly

A University of Texas at Dallas research group has developed an autonomous robotic team of devices that can be used at hazardous or difficult-to-reach sites to make surveys and collect data — providing more and faster insights than human beings are able to deliver.

**Dr. David Lary**, professor of physics, said his group's robot teams — composed of autonomous devices that gather data on the ground, in the air and in water — would be ideally suited for hazardous environmental situations and/or for holistic environmental surveys of ecosystems.

"An autonomous team like this could do a survey and rapidly sample what's in the air and the water so that people could be kept out of harm's way," Lary said. "In another context, the robots could provide a general survey of ecosystems, or they could look at situations such as harmful algal blooms in lakes."

Lary said the autonomous robotic teams are also useful for real-time decision support in areas such as agriculture and infrastructure inspection.

A recent demonstration in the field showed how the autonomous robotic team can rapidly learn the characteristics of environments it has never seen before. Lary and his colleagues deployed the robots in a test run in Plano, Texas, to demonstrate their data-gathering capabilities. He said he hopes the robot team prototype can be a model for changing the methods that are used to survey disaster sites, waterways and extreme environments.

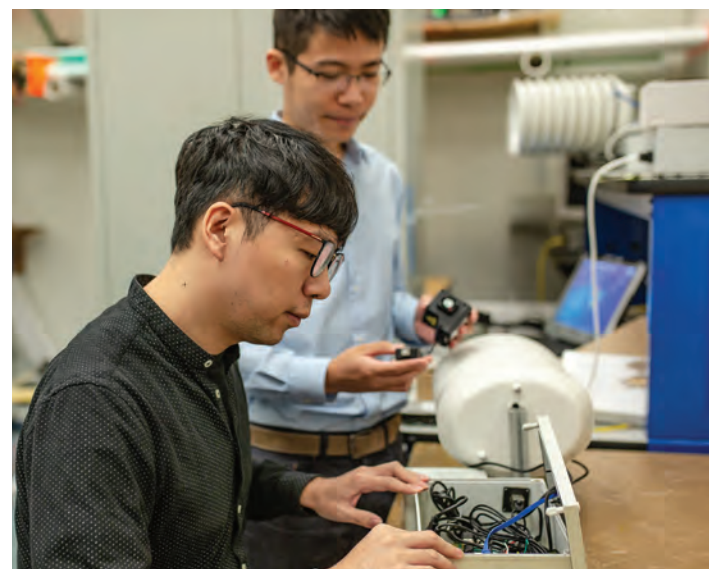
The rapid acquisition of holistic data by coordinated robotic team members facilitates transparent, data-driven decisions. The approach allows for more real-time data to be gathered more rapidly and for streamlined software updates for the machines, Lary said.

The multirobot, multisensor team can include various combinations of devices, such as a robot boat that carries sensors to measure water composition, as well as sonar to track objects below the surface and to provide aquatic remote sensing. At the same time, an overflying

aerial robot collects hyperspectral images, providing an entire spectrum for every pixel in the image. Using the remotely sensed information, the devices — through machine learning — can rapidly construct wide area maps of the environmental state.

"Not only do we get depth information, we also can measure the height of any vegetation that's in the water. We can determine what is at the base of a pool, pond or estuary and the kinds of fish in the vicinity. With the sonar we can count and size the individual fish and get the total biomass in a vertical profile," Lary said.

In addition to the boat, the robot team includes an unmanned aerial drone that carries several cameras, an array of onboard sensors and a downwelling irradiance spectrometer, which gathers data about the radiation directed toward the Earth from the sun or the atmosphere. In addition, a ground vehicle can collect soil samples and utilize ground-penetrating radar. Satellite data can be added to the team to provide photos and measurements from space.

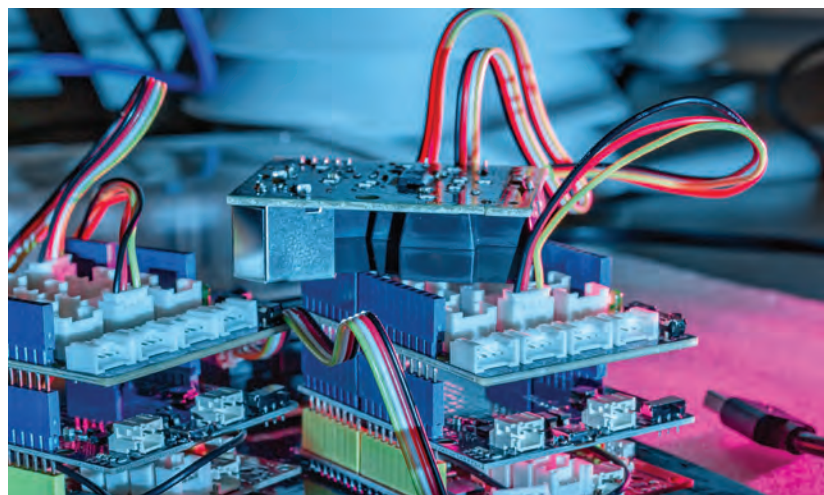






**Left:** In the robotics lab, Yichao Zhang (physics) and Xiaohu Yu (geospatial information sciences) helped maintain drones and other devices before graduating from UT Dallas.

**Above:** Physics student Adam Aker follows directions from Dr. David Lary.



Besides allowing access to areas that are typically inaccessible to or dangerous for humans, the robot team approach significantly enhances the amount of data that can be collected.

“In just a few minutes we can collect many thousands of data records,” Lary said. “So, if you were to deploy a robot team multiple times over several locations in a period of about a month, you could get hundreds of thousands — even millions — of records. It’s the rapid acquisition of relevant data that can help keep people out of harm’s way, which is the point.”

In addition to gathering large amounts of correlated data rapidly, another way that the robot team is improving the survey process is the ease by which software updates are provided to the machines.

“Just like Tesla vehicles, they simply receive over-the-air updates that enhance their capabilities. It works well for Tesla, and we envision the same thing for our robotic team,” he said.

Lary said the robot team is just one aspect of his research, which is focused on developing comprehensive, turnkey sensing systems that connect with back-end data systems to turn streams of information into actionable insights.

“The single driving goal of everything I do is preemptive human protection. It’s trying to keep people out of harm’s way and to have a suite of sentinels that can give us real-time information,” he said. “I want this capability to be available to municipalities, health departments, corporations and individuals, through an extensible store where, like Lego blocks, you can get the individual sensing systems that can help with disaster response or just routine planning.”

The research was funded in part by the Texas National Security Network Excellence Fund award for Environmental Sensing Security Sentinels and the SOFWERX award for Machine Learning.

Lary’s research was assisted by the Texas Research and Education Cyberinfrastructure Services center. Supported by a grant from the National Science Foundation, the center provides computing support for various research projects at UT Dallas and other UT System schools.



# NSM accepts *New Dimensions* campaign challenge

Alumni, faculty and friends rally to the School of Natural Sciences and Mathematics to support the University's *New Dimensions: The Campaign for UT Dallas*. Through generous donations, NSM students and faculty will benefit for generations to come through named endowments, scholarships, fellowships and professorships to the school.

The University of Texas at Dallas has provided the North Texas community with a hub for technical ingenuity, world-class education and professional development. *New Dimensions* will build upon a half-century of momentum to extend our University's impact across the city of Dallas, the state of Texas, the United States, and beyond.

Below are recent NSM champions supporting *New Dimensions: The Campaign for UT Dallas*. Visit [newdimensions.utdallas.edu](http://newdimensions.utdallas.edu) and/or [giving.utdallas.edu/nsm](http://giving.utdallas.edu/nsm) to be a part of our growing momentum.

## GRANTS

### Communities Foundation of Texas' W.W. Caruth, Jr. Fund - \$500,000

A three-year grant from the Communities Foundation of Texas supports the UTeach Dallas program, which allows students to combine a degree in science, technology, engineering and/or mathematics (STEM) fields with a secondary teaching certificate without adding time or cost. The grant specifically addresses the urgent need in North Texas for STEM teachers for underrepresented, high-needs schools and the program's efforts to recruit and retain science and math majors for careers in teaching.



Margie Rutford and the late Dr. Robert Rutford



The late Colton William Roberts



The late Dr. John H. Hoffman

## STUDENT SUPPORT ENDOWMENTS

### Ron and Chris Overberg Fellowship - \$150,000

Established by Ron Overberg BS'79, MS'84, PhD'85, this permanent endowment supports graduate student fellowships within the school.

### Bob and Margie Rutford Fellowship for Geosciences - \$100,000

Established by Mrs. Margie Rutford, this grant supports UT Dallas students pursuing a graduate degree in geosciences. "Bob and I wanted to help students who otherwise might not be able to continue on with a science education," Mrs. Rutford said.

### Colton William Roberts Scholarship for Geosciences - \$80,000

Established by Mr. Bill Roberts, Mr. Michael Szkrybalo, and Mrs. Tanya A. Roberts, this permanent endowment is in support of UT Dallas students pursuing an undergraduate degree in geosciences.

### Dr. John H. Hoffman Memorial Scholarship for Physics - \$100,000

Established by Dr. Greg Hoffman, Ms. Margaret Hoffman, Mrs. Rita Gibson, and Mrs. Julie C. Condry, this permanent endowment supports full-time UT Dallas students pursuing an undergraduate degree in physics.

# NEW DIMENSIONS

THE CAMPAIGN FOR UT DALLAS



## ENDOWED CHAIRS AND PROFESSORSHIPS

### **Drs. Basheer and Shakila Ahmed Distinguished Chair in Natural Sciences and Mathematics - \$1,000,000**

Established by Dr. Basheer Ahmed and Dr. Shakila Ahmed, this permanent endowment supports the research-enhancing activities of the chair holder, with a focus on interdisciplinary research across those explored in the School of Natural Sciences and Mathematics, currently biological, physical, mathematical, computational, chemical and/or geological sciences.



*Dr. Basheer Ahmed with his son Mr. Sameer Ahmed*

### **Dean and Cindy Sherry Professorship in Chemistry - \$100,000**

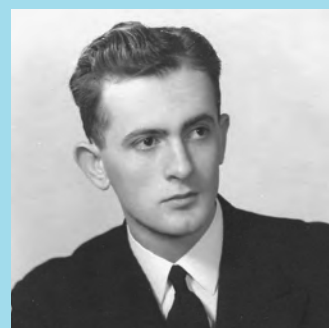
Established by Dr. Dean Sherry and Dr. Cindy Sherry BS'78, this endowment supports the chemistry and biochemistry research-enhancing activities of the professorship holder.



*Drs. Cindy and Dean Sherry*

### **Jack P. Mize, PhD Professorship in Natural Sciences and Mathematics - \$100,000**

This permanent endowment established by the late Mr. Warren Gould and the estate of Mr. Jim Gould in memory of Dr. Jack P. Mize, supports the research-enhancing activities of the professorship holder.



*The late Dr. Jack P. Mize, shown during WWII*



# Alumnus, FSU President Cites Hard Work, Education as Keys to Success

The year 2021 was a good one for University of Texas at Dallas alumnus **Dr. Richard McCullough BS'82**.

McCullough became the 16th president of Florida State University (FSU) in August, bringing more than 30 years of academic research and leadership experience to the role as well as a commitment to innovation and entrepreneurship, and diversity, equity and inclusion.

"When the opportunity came before me, Florida State University was on a huge meteoric rise, going from No. 43 to No. 19 in *U.S. News & World Report's* ranking of the nation's public universities," he said. "Florida State University is a powerhouse research and educational institution. FSU also has a true storied tradition in athletics. I'm a loyal sports fan."

As president, McCullough's major goals include expanding FSU's faculty and its research portfolio, as well as building new strategic initiatives to continue the university's success with first-generation students.

That is something that resonates with McCullough, who grew up in Mesquite, Texas, and was the first in his family to go to college. He attended Eastfield Community College before earning a bachelor's degree in chemistry from UT Dallas in 1982.

"My goals were to remain focused, excel in school, and land a suitable job after graduating," McCullough said. "I knew that education was the key to success."

While McCullough found he had a knack for chemistry, he admitted it was not effortless.

"During my time as a student at UT Dallas, the institution carried, as it still does, the reputation of being arduous, and everyone in the chemistry program worked very hard," said McCullough, who was named a distinguished alumnus in 2005. "The University was a small commuter school when I was there. It has since grown into a large university with outstanding programs and excellent leadership."

He pursued a doctoral degree in organic chemistry from Johns Hopkins University in 1988 and spent two years as a postdoctoral fellow at Columbia University in New York.

"Initially I thought I would pursue a career in the chemistry industry but while I was at Johns Hopkins, I became interested in a career in academics. It was at Johns Hopkins where I met my wife, who was also a graduate student. She was very supportive of me pursuing this different career path," he said.

McCullough began his professional academic career at Carnegie Mellon University in Pittsburgh. During his 22 years there, he served as head of the chemistry department, dean of the Mellon College of Science and vice president for research.

In 2012, McCullough moved to Harvard to serve as vice provost for research and professor of materials science and engineering. A staunch champion of diversity, he created a pipeline of Black, Latinx and other minority academics through an annual workshop that helps diverse postdoctoral fellows and students obtain academic jobs.

Diversity, equity and inclusion remain his top priorities at FSU.

"This is a critical issue for us, and we are committed to recruiting and hiring diverse leaders," McCullough said. "We believe diversity is a pathway to excellence."

# Two NSM grads honored at 2022 UTD Awards Gala



**Dr. Suzanne Cole BS'99, BA'99**, a medical oncologist who currently serves as medical director of the Richardson-Plano Simmons Cancer Clinic at UT Southwestern Medical Center, earned her MD at UT Southwestern.

She spent eight years caring for patients in local communities before joining the UTSW faculty in 2018. She is the founder of the Hematology & Oncology Women Physician Group.

#### **A few words from Dr. Cole...**

"I feel like I have the best job. It's so meaningful to me. I feel lucky that I get to do this kind of work. I also feel like I accidentally fell into it, and never really intended to be a cancer physician.

"I thought I was going to be a scientist, doing bench research trying to find the cure. Then, I realized something about myself – that I really wasn't cut out for that kind of work because it's very solitary. Lab work is very different from being in clinic and being with patients. I pivoted during my years at UTD after I had done a summer of lab work.

"The entire four years I would take a biochemistry class and then I would take a dance class. I would take a physics class and then I would go to my poetry class. And I think engaging these different sides of your brain – the ability to switch one's thinking – just was better for me and really enriched me and made me a more whole person. No one can take that education away from me. It's part of my being. I'm grateful having experienced it."



**Dr. William F. Tate IV MAT'87** is president of Louisiana State University, the first African American to head any Southeastern Conference (SEC) school. Before being named to this position in 2021, Dr. Tate served as executive vice president for academic affairs and provost at the University of South Carolina, and as dean of the graduate school and as vice provost for graduate education at Washington University in St. Louis.

Dr. Tate received his PhD in mathematics education from the University of Maryland, an MAT in mathematics education from UT Dallas, a master's of psychiatric epidemiology from Washington University School of Medicine and a BS in economics from Northern Illinois University.

#### **A few words from Dr. Tate...**

"What's great about being at LSU is it's a great research university. It's comprehensive in nature with a focus on agricultural and mechanical – that's its history. But it also has a very strong focus in music, arts and other areas that I think we do a very good job in.

"My education at UT Dallas really is foundational for my career. I learned a great deal more mathematics because I was in economics as an undergraduate, and I was taking classes in the math department at UTD as well the math ed courses – courses related to learning science – that's what we call it now – back then it was called the psychology of education. But all of that provided me the background to then go into a research career as a social scientist and into math education. It wouldn't have been feasible without that experience."





### Graduate Student's Nanotech Research Paper Grabs Attention

Recent UT Dallas graduate **Mai Huynh PhD'21** received the Editor's Choice award from the journal *Nanomaterials* for her research paper on the interactions of carbon nanotubes with mammalian cells called macrophages.

Editor's Choice articles are selected based on recommendations by the scientific editors at the journal's publisher. Selections are those the editors believe will be particularly interesting to other authors and leaders in the field.

Huynh, who graduated with her doctorate in chemistry, said she felt very honored. "It means a great deal to me. This accomplishment not only proved to me that my hard work paid off, but also helped me bring this important research topic to many scientists all over the world," Huynh said.

"I hope that my research findings can provide a background for future studies and discoveries that can make a difference in our lives."

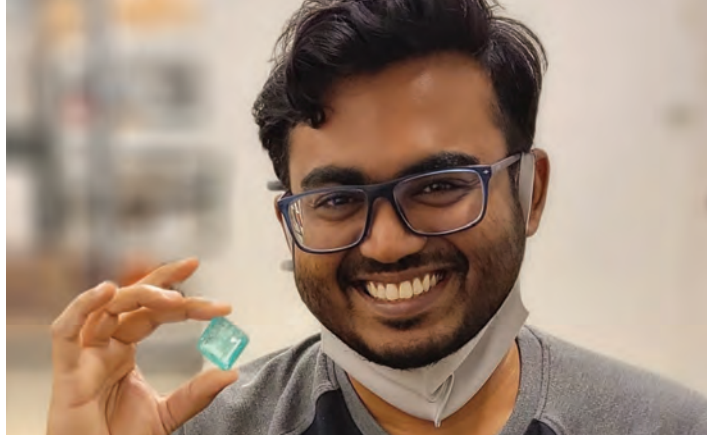
Carbon nanotubes – tubes made of carbon the diameters and lengths of which are measured in nanometers – have many applications, ranging from the development of artificial muscles to drug-delivery systems. They also are potentially toxic, and researchers at UT Dallas and elsewhere are investigating what special coatings might minimize such toxic effects as well as enhance biomedical applications.

Huynh's 23-page journal article looks at the interactions of multi-walled carbon nanotubes (MWNTs) with mammalian macrophages, cells that are first responders to foreign invaders in the body.

"My first project was an extensive characterization of the physical and chemical properties of the specific MWNTs I used for my biology projects," Huynh said. "My second project, which this article was based on, involved determining the MWNT receptors present on macrophages that may play critical roles in the pathogenesis of MWNTs."

Huynh's research found that on macrophages, receptors called class A-type 1 scavenger receptors (SR-A1s) are key receptors for MWNTs that have been coated with bovine serum albumin (BSA).

A better understanding of the mechanisms by which MWNTs interact with macrophages should lead to the rational design of nanotoxicity remediation efforts as well as other biomedical applications, said Huynh, who was a Eugene McDermott Graduate Fellow.



### GeoClub President Has Gem of an Experience at Perot Museum

**Pranto Anandmaya**, a UT Dallas senior majoring in geosciences who also is president of the Geo Club, completed an internship at the Perot Museum of Nature and Science in Dallas, where he got a behind-the-scenes look at the museum's operations last fall, and a feel for the work involved in presenting exhibitions.

The Perot Museum is a natural history and science museum in the Victory Park area of downtown Dallas. The complex has six floors with the first five floors displaying exhibits and the top floor housing administrative offices. Anandmaya worked for Kimberly Vagner, director of the Gems and Minerals Center of Excellence at the Perot Museum.

"I am generally looking for interns who are inquisitive, self-motivated and flexible," Vagner said. "After reviewing Pranto's application and interviewing him, I felt confident that he would be a great fit for the internship."

Most of the gemstones displayed at the Perot Museum come from different locations and collectors. They are chosen based on their rarity and public appeal, Vagner said.

Anandmaya took part in activities focused on preparing the gem and mineral center's Paula Crevoshay exhibit. The acclaimed jewelry designer is known for her innovative, colorful and extraordinary jewelry designs, which have earned her the title, "Queen of Color."

The exhibit, "Paula Crevoshay: The Shape of Matter – Through an Artist's Eye," featured approximately 70 of her designs along with loose gems and minerals in her collection. The exhibit aims to create a connection between art and nature by displaying jewelry pieces made with gems and minerals from crystal systems.

"Some of the gems I worked with had rare inclusions of other minerals. For example, there was a quartz with rutile inclusions that looked like a biblical cross, which was very impressive," Anandmaya said.

While interns are not allowed to handle gems and minerals loaned to the museum, they may handle items from the Perot Museum's permanent collection.

Anandmaya sorted gems according to their types and crystal structures, and cataloged the information on spreadsheets, including their trade name, carat weight, mineral name and brief description.

"Seeing my writeups on an exhibition's display tablets and posting to the museum's Instagram account really made me feel valued and appreciated. It was amazing seeing all the work come together at the end," Anandmaya said.

"Museums are a personal favorite of mine, and I always visit museums whenever I'm in a new city. I've always wanted to know how museums function and how the displays are maintained, and I finally learned what goes on behind the scenes, thanks to this internship experience," Anandmaya said.

# Did You Know...?

**#1** UT Dallas is *Forbes'*  
Best Value Public  
University in Texas.

**#3** in the nation among public  
universities for National  
Merit Scholars in 2020.

**30** NSM offers more than  
academic programs.

**4** Nobel laureates  
interacted with NSM:  
one graduated with  
a PhD and three others  
taught classes.

**5** American Association  
for the Advancement  
of Science Fellows  
among NSM faculty.

Over **\$19** million in  
NSM research expenditures.  
(FY '21)

**50** National Merit Scholars  
declared NSM majors.  
(AY '21)

**1 of 20** named Centers  
of Actuarial Excellence  
in the U.S., and the only  
center in the Southwest.

UT Dallas ranks  
**#23** among medical school  
feeders in the U.S.,  
**#3** in Texas. (*American Association  
of Medical Colleges*)

**2nd** most declared  
major of UTD freshmen  
is biology. (AY '21)



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