Is NATURE the ANSWER?
Doctoral student Kristina Clemons works with the nanomanipulator developed by Guido Verbeck, associate professor of chemistry. A small-scale version of the device is being deployed to Afghanistan this summer, allowing military investigators in the field to identify chemical signatures on the nanoscale. Read more about Verbeck and other UNT forensic experts on page 36.
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At the new Research Greenhouse Complex at UNT’s Discovery Park, Stevens Brumbley, associate professor of biological sciences, is engineering grasses such as sugarcane to create more environmentally friendly plastic. Bioplastics or their precursors are made in the cells of the plants, accumulating there until harvested.

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UNT.EDU/UNTRESEARCH | UNT RESEARCH 2013
The University of North Texas has a long history of nationally recognized excellence in the arts, education and humanities. In recent years — encouraged by the state’s efforts to support emerging research universities — we also have put more emphasis on fast-growing, innovative programs in engineering and science.

UNT is making good progress. Since the creation of our College of Engineering in 2003, the college has made incredible gains in enrollment, innovative degree programs and research. It has world-class programs such as materials science and mechanical and energy engineering. And it is establishing itself as a pacesetter in the areas of energy-efficient materials and green building technologies and practices.

Capitalizing on long-held strengths in the sciences — which include a century-old chemistry program, a nearly 90-year-old biological sciences program and a more than 75-year legacy in the environmental sciences — the university is fast becoming one of the nation’s preeminent research hubs in plant science research. The scientists in our Signaling Mechanisms in Plants research cluster are studying how plant cells communicate, finding solutions for energy, agriculture, nutrition and medicine.

Guided by our four bold goals, we are focused on high quality in every area — education, research, student support, workplace operations and community engagement. Our emphasis on students and student success includes a more intense focus on research performance and scholarship.

We strive to be a university that is at the forefront of new ideas and new technologies. Having innovative faculty who are at the leading edge improves the quality of education. And it means our students are taught in an environment that instills the knowledge and skills that are necessary to excel in their careers.

Sincerely,

V. Lane Rawlins
President
president@unt.edu

V. Lane Rawlins is the 45th
president in the 123-year history
of the University of North Texas.
INITIATIVES

PLANT SIGNALING
A new era of scientific research is evolving at UNT, and it is being led by the Signaling Mechanisms in Plants research cluster. The most mature of the university’s initial collaborative research groups created in 2008 to strengthen the state’s economy, bolster research and develop technology vital to societal needs, the cluster has made strides in hiring faculty and developing infrastructure.

NEW FACULTY HIRES
World renowned plant scientists Ron Mittler, Vladimir Shulaev and Rajeev Azad all joined the university in 2010. Together with six founding plant cluster researchers, they have helped bring more than $15 million in research funding to UNT in the last three years.

Joining the group in February 2013 is Richard A. Dixon, a specialist in metabolic engineering of plants and a National Academy of Sciences member. He has served as the director and founder of the plant biology division at the Samuel Roberts Noble Foundation since 1988.

Dixon’s research focuses on how to use metabolic engineering to produce plant-derived chemicals that could treat human diseases, create biorenewable products and improve the quality of forage crops.

He is the principal investigator or co-principal investigator on active grants exceeding $9 million, including a Department of Energy grant focused on producing biofuels more efficiently and a National Institutes of Health grant investigating the potential of chemicals derived from grape seeds to prevent the onset of Alzheimer’s disease.

METABOLOMICS LABORATORY
In addition to successes in faculty hiring, the cluster also has made strides in creating new state-of-the-art laboratories. In fall 2012, the Metabolomics and Metabolic Signaling Pathway Research Laboratory overseen by Shulaev opened and was named a Center of Innovation by the Waters Corp., a leading manufacturer of mass spectrometry instruments.

The lab will use analytical methods such as mass spectrometry and liquid chromatography to analyze the chemical makeup of living organisms. The ability to characterize small molecules called metabolites is a powerful tool for understanding how cells work and how their function changes during metabolic processes.

Metabolomics can be used to help understand human disease and improve crops. Shulaev says the technologies in the lab can lead to a better understanding of the molecules that respond to stress in plants, giving researchers the tools to improve natural defenses in crops.

Metabolomics also can help to identify novel plant-derived chemicals with potential benefits for health and nutrition.

Shulaev’s lab is one of about 20 worldwide to be selected for the Waters Corp. Centers of Innovation program, which recognizes analytical scientists facilitating breakthroughs in health and life science, environmental protection and other areas.

As a Center of Innovation, Shulaev’s lab will be able to use newly commercialized instrumentation and technology on an evaluative basis. He says the new lab will facilitate teaching the use of analytical instruments to students at all levels.

“It’s very important to train the next generation of scientists, especially in mass spectrometry,” he says.

The lab already includes instruments rarely found outside the top biomedical labs. The team will collaborate with the Waters Corp. to develop new technologies and metabolomics applications for the various tools.

“We have one of the best labs, especially in plant signaling, in academia,” Shulaev says.
Two Universities Celebrate a Decade of Partnership

The University of North Texas celebrated a 10-year partnership with the Universidad Autónoma del Estado de México in 2012 — a collaboration that has supported research and student exchange through the years and fostered cultural ties for students and faculty of both universities.

“Many institutions have bilateral agreements across the globe, but to our knowledge, few if any have developed the level and depth of mutual commitment that is today in place between UAEM and UNT,” says Warren Burggren, UNT provost and vice president for academic affairs.

From the first faculty collaborations to the research funding and exchange programs of today, initiatives between the two universities continue to expand.

Early Collaborators

The partnership began with the work of Witold Brostow, UNT Regents Professor of materials science and engineering and director of the Laboratory of Advanced Polymers and Optimized Materials. He was the first UNT faculty member to establish a connection to UAEM, which is located in Toluca in the state of Mexico, about 45 miles west of Mexico City.

He says it all began when his post-doctoral researcher, Gonzalo Martinez Barrera, became a UAEM faculty member.

“I was visiting Gonzalo in Toluca when I met Rafael López Castañares — a fellow materials scientist and the UAEM rector at the time,” says Brostow, who collaborated with Castañares on a materials science education project and invited him to visit UNT.

With the help of Burggren, then dean of UNT’s College of Arts and Sciences, a formal agreement allowing the universities to work together was signed in 2002.

Research Seed Funding

A popular initiative of the partnership has been the Research Seed Funding Program, created to support joint projects between faculty members and graduate students of the two universities.

Since 2010, the program has provided more than 30 awards to faculty members across UNT departments, recently including library and information sciences, physics, anthropology and geography.

“The seed fund has established itself as one of the most successful means of connection between the two institutions,” says Manuel Goel, director of the UAEM academic liaison office at UNT.

When UNT educational computing doctoral student Adriana D’Alba needed financial assistance to conduct research for her dissertation, her major professor, Greg Jones, helped her write a grant proposal for the seed funding program.

Using software created by Jones, associate professor of learning technologies, D’Alba had designed a 3-D virtual environment for an exhibit of murals on permanent display at UAEM, where she had earned her undergraduate degree.
The award allowed her to test her project in Toluca, where she worked with Bertha Abraham, an investigator at UAEM’s Research Center in Social Sciences and Humanities.

D’Alba is now an assistant professor of education at Grambling University after earning her doctorate from UNT in 2012.

“I could not have done this research or gone this far without UNT and UAEM,” she says.

Bruce Hunter, acting director of UNT’s Institute of Applied Science, has visited UAEM numerous times since 2004 as part of a team evaluating hydrologic environmental services at one of Mexico’s national parks. He has taught courses in Toluca on geographic information systems and human impacts on the environment.

“When our students go to Mexico and see the people in their ordinary lives, their eyes are opened,” Hunter says. “We can learn a lot from Mexico about the way that environmental resources are used. We take water for granted in the U.S., but in Mexico, water is often used more wisely.”

Stacey Antilla, a doctoral student in environmental science, visited UAEM twice in 2012 to research Mexico’s environmental services for her dissertation.

“I had spent time at a resort in Cancun, but going to the ‘real’ Mexico was a life-changing experience for me. It broadened the coursework that I’ve been doing here at UNT,” she says.

**Different Perspectives**

The Research Seed Funding Program is just one of numerous UNT-UAEM connections.

Other initiatives include a scholarship program for UAEM graduates who enter doctoral degree programs at UNT, a summer institute hosted by UNT’s Department of Linguistics and Technical Communication that provides UAEM students and faculty with intense English language instruction, the academic liaison offices for the UAEM and UNT campuses, and exchange programs for students of both universities.

“The partnerships benefit students and faculty going both ways,” Brostow says. “With our global economy, it’s important for students to have exposure to different cultures and customs.”

As an undergraduate at UAEM in 2003, Oscar Olea-Mejia attended a lecture delivered by Brostow and later came to UNT as a doctoral student, inspired to be a materials scientist. He earned his UNT doctorate in 2007 and now teaches in UAEM’s College of Chemistry, using green chemistry techniques to research materials science at the nano-level.

“I wanted to be a researcher, but I became a teacher too. I learned that one goes with the other,” he says, adding that some of his students have also come to UNT through joint research projects with Brostow.

“The partnerships and achievements of the students at both universities are a win-win situation,” Olea says. “Different perspectives, experiences and equipment complement each other.”

Burggren says that mutual understanding continues to be a benefit of the partnership as a whole.

“As we celebrate the first decade of our formal collaboration, the common themes of reciprocity, respect and quality of our endeavor have been retained and strengthened,” he says.

“This successful international cooperation has enriched both universities.”

UNT Provost Warren Burggren, left, was named Rector Honoris Causa by UAEM Rector Eduardo Gasca Pliego in 2012 for his support of the UNT-UAEM partnership and his research collaborations. He is the first recipient from outside Mexico.
NEWS BRIEFS

AUTISM TREATMENT, RESEARCH AND SUPPORT

UNT’s Kristin Farmer Autism Center opened in 2012, providing families in the North Texas region and beyond with a resource for comprehensive autism spectrum disorders treatment, research and support.

Founded with the help of donor and alumna Kristin Farmer — founder of Comprehensive Educational Services Inc., known as ACES — the center brings UNT’s interdisciplinary autism services and research together under one roof.

The high-quality services are designed and implemented by top researchers, professors and professionals in special education, applied behavior analysis, early childhood intervention, speech and hearing sciences, and other autism and disabilities intervention fields.

Services and programs provided at the center include diagnostic testing and evaluation; full-time intervention services; behavior analysis and therapy; and speech and language, occupational and physical therapy. Future programs at the center may include play, music and art therapy; psychological counseling for families, parents, siblings and individuals; nutritional services; and social skills training.

Experts from several UNT colleges are collaborating on programs and research, continuing UNT’s history of expanding autism research and programs. Kevin Callahan, a former faculty member in the Department of Educational Psychology, is the center’s executive director.

FIFTH IN THE WORLD

The logistics program in UNT’s College of Business has been ranked the world’s fifth best program for supply chain and logistics research productivity by the International Journal of Physical Distribution and Logistics Management.

Faculty have researched topics including professional drivers’ safety decisions, risk and value in complicated supply chain systems, and performance-based contracting approaches for aircraft manufacturers’ service models. They work with corporations including Transplace, Sysco, Pepsico, Southwest Airlines, Lockheed Martin, Hillwood Properties and JC Penney.

Terry Pohlen, associate professor of marketing and logistics, is the director of the Center for Logistics Education and Research.

Stress and Heart Disease

John M. Ruiz, assistant professor of psychology, was awarded a $1.63 million grant from the National Heart, Lung and Blood Institute of the National Institutes of Health to examine how daily stress may contribute to heart disease. He will lead a team from five institutions during the three-year study, examining associations between social vigilance and atherosclerosis.

In fall 2012, Ruiz received UNT’s Competitive Funding Award for the principal investigator responsible for the highest amount of new competitive research funding in the fiscal year. His research areas include cardiovascular behavioral medicine and psychophysiology, and Hispanic health and health disparities.

New Start-Up

Jeffry Kelber, Regents Professor of chemistry, has launched Quantum Devices Corp. to develop devices that could improve the speed and efficiency of electronics.

He previously patented the process of depositing graphene, a form of carbon, directly on an electronically insulated substrate. The
Kelber says graphene chips could lead to new types of computer architectures. Through Quantum Devices, which is licensing his patent from UNT, he will develop prototypes of several graphene-based devices. He and collaborator Peter Dowben from the University of Nebraska-Lincoln performed the initial research with funds from the Semiconductor Research Corp.

**Fulbright Awards**

Several UNT faculty members received recent Fulbright honors. Gerald Knezek, Regents Professor of learning technologies, was awarded a Fulbright Senior Specialist appointment to the University of Twente in the Netherlands in 2011-12. He conducted research and writing in technology diffusion, innovation and integration into educational environments. He also presented seminars in areas such as psychometric instrumentation and virtual environments. He extended work he began while co-chair of the 2011 International Summit on Information Technologies in Education at UNESCO.

James Thurman, assistant professor of studio arts, was a Fulbright specialist at Kadir Has University in Turkey in the summer. He helped the university redesign curriculum for its 3-D design program. At UNT, he is 3-D design core coordinator and teaches metalsmithing and jewelry.

Pankaj Jain, assistant professor of philosophy and religion studies, received a Fulbright U.S. Scholar research grant as a 2012-13 fellow in the Fulbright-Nehru Environmental Leadership Program.

He is assessing initiatives of the Himalayan Environmental Studies and Conservation Organization in areas such as indigenous technology, agriculture and women’s empowerment. To develop a project to track the progress of such non-governmental organizations toward their goals, he interviewed residents in northern India about their sustainability projects, programs and aspirations.

Ami Moore, associate professor of sociology, received a Fulbright U.S. Scholar research grant to conduct AIDS-related research in Lome, Togo, through the end of 2012. She is studying the correlates of personal network characteristics and sexual risk behavior among men in Togo who have same-sex relations. She has studied other groups in Togo, including older people living with HIV/AIDS.
**Female Athletes and the Media**

Tracy Everbach, an associate professor in the Frank W. and Sue Mayborn School of Journalism who has researched media coverage of female athletes since 2005, compared the coverage of male and female athletes at the 2012 Summer Olympics.

She previously researched newspaper coverage of the 1908 Summer Olympics, which also were in London, and notes that female Olympic athletes have traditionally received more attention for sexuality and attractiveness than male athletes.

However, female athletes also receive much more media coverage during the two weeks that the Olympics are televised than many college or professional female athletes.

In a recent study, Everbach interviewed female athletes ages 18 to 22 about their thoughts on the media’s focus on the sexuality of professional female athletes and pressure on those athletes to pose for sexualized photos. Most were not happy with the images, while a few said they were empowering.

Everbach’s research interests also include gender and race in news reporting and newsroom management. She worked as a newspaper reporter for 14 years, including 12 years at the *Dallas Morning News*.

**Guggenheim Fellowship**

Dornith Doherty, professor of photography, was awarded a prestigious fellowship from the John Simon Guggenheim Memorial Foundation. The 181 fellows — representing the U.S. and Canada — were chosen from about 3,000 applicants.

Doherty plans to use the fellowship to complete her *Archiving Eden* project, in which she uses X-ray machines at international seed banks to photograph seeds and cloned plants. She then incorporates the X-ray images into digital collages.

Doherty began *Archiving Eden* in 2008, inspired by the construction of the Svalbard Global Seed Vault to secure the world’s seed collections. In 2010, she was one of only a few people allowed to visit the vault. With the Guggenheim Fellowship, she plans to photograph seed banks in Australia, Brazil and Russia.

**Distinguished Scholars**

Three merchandising and digital retailing faculty members were named distinguished scholars by the Korean Society of Clothing and Textiles at its April 2012 conference in Seoul — more faculty members than any other university.

JiYoung Kim and Kiseol Yang, assistant professors, and HaeJung Maria Kim, associate professor, were among 20 scholars of Korean origin from universities in China, Japan and the U.S. acknowledged for their contributions to the Korean and global clothing and textiles industries and educational societies. This is the first time the society extended the honor to international scholars.

Kim, Yang and Kim are members of UNT’s Consumer Experiences in Digital Environments research cluster. HaeJung Maria Kim studies digital influences on the global retailing and merchandising industry, and sustainable consumption.
JiYoung Kim researches consumer behavior in online retailing, particularly consumer loyalty and purchase intentions. Yang’s research interests include smartphone shopping applications and other mobile shopping services.

**Fossil Identification**

George Maxey, lecturer in geography, has been identifying specimens at UNT’s Meteorite, Rock, Mineral and Fossil Identification Lab since it opened in 2010. Fossils found by residents and identified there include predatory fish that lived between 65 and 100 million years ago — the skull of an Enchodus, known as the “saber-toothed herring”; the lower jaw of a Saurodon, which had a spear-like snout; and the 250-pound head and a flipper of the Xiphactinus Audex, which had fang-like teeth and an upturned jaw.

Maxey says the lab receives calls from across the Southwest, and specimens arrive for identification several times a week. He ranks the Xiphactinus Audex as among the most exceptional finds brought to the lab.

**Academy Fellow**

Robert L. ‘Bob’ Bland, professor and chair of the Department of Public Administration, was elected a fellow of the National Academy of Public Administration in fall 2012 for his professional accomplishments in teaching, research and public service. NAPA and the National Academy of Sciences are the only two national academies chartered by Congress to support and advance America’s interests through scholarly and applied expertise. Through standing and special panels, NAPA advises Congress and federal agencies on matters of public policy and management.

Bland, an expert in governmental finance, is the author of three books and numerous articles on public budgeting, finance and revenue generation. His book *A Budgeting Guide for Local Government*, going into its third edition, is one of the pillars of professional reading for local government managers and graduate students. He is the founding chair of the Department of Public Administration and is the director of the Center for Public Management.

An exceptional fossil — a 250-pound head and a right flipper of the predatory fish Xiphactinus Audex — was discovered by Denton County residents and identified at UNT’s Meteorite, Rock, Mineral and Fossil Identification Lab by George Maxey.
Tech Titan

The Net-Centric Software and Systems Center, a National Science Foundation-sponsored Industry/University Cooperative Research Center based at UNT, was selected as the university-level 2012 Tech Titan of the Future by the Metroplex Technology Business Council.

The award recognizes higher education institutions in the Dallas-Fort Worth area that support students in choosing engineering and technology-related disciplines as a preferred path. Krishna Kavi, professor of computer science and engineering, is director of the center.

A joint venture between academic, government and commercial institutions, it focuses on fundamental research needed for the development and deployment of software and applications into cloud and net-centric environments — software and information available over a network or in a central location rather than on individual computers.

Bilingual Education
Rossana Boyd, director of the bilingual/ESL teacher certification programs and principal lecturer in teacher education and administration, is a national leader in bilingual education. She directs the Future Bilingual Teachers Academy, a summer program jointly hosted by UNT’s College of Education and the Fort Worth ISD to introduce bilingual high school students to the field of teaching and encourage them to consider a career in bilingual education.

Academy administrators hope to alleviate the bilingual teacher shortage by providing a pre-college experience designed to motivate and inspire the students to become teachers of English language learners. The project includes funding from the Sid W. Richardson Foundation.

Boyd is a member of the National Association for Bilingual Education and served as the association’s president in 2011-12.

Veterans Study
Researchers at UNT, which has an estimated 1,200 former and active military members among its students, are investigating the challenges veterans encounter when they return to college or enroll for the first time. Areas of study include strategies veterans use to cope with stress from deployment experiences and how that may impact their academic progress. Shelley Riggs, associate professor of psychology, and four student researchers are recruiting 200 veterans from all military branches for the project in the Family Attachment Lab.

Riggs says past research has shown that nontraditional students often are more disciplined about studying and attending class than younger students. She says student veterans may have some of these same strengths and other values learned in the military that contribute to academic success despite possible challenges. The goal is to learn about risk and resilience factors to inform academic and clinical programming on campuses.

Childhood Nutrition
Priscilla Connors, associate professor of hospitality and tourism management, was the principal investigator on a U.S. Department of Agriculture grant designed to combat childhood obesity by encouraging middle school students to eat more fruits and vegetables. Priscilla Connors, associate professor of hospitality and tourism management, was the principal investigator on a U.S. Department of Agriculture grant designed to combat childhood obesity by encouraging middle school students to eat more fruits and vegetables.
students to choose more nutritious items from school cafeteria lunch menus.

Connors and an interdisciplinary team — including students in art and applied anthropology — collected data on menus, food choice, consumption and plate waste in several Texas middle school cafeterias. They then identified low-cost strategies to encourage nutritious choices.

Connors says the study confirmed that most children ate the main dish item but were less likely to finish vegetables, and a quarter selected no fruit. Suggested strategies for the cafeterias included more colorful presentations, more variety, and convenient packaging and portions.

**NSF Program Director**

Shobhana Chelliah, professor of linguistics, was selected as a rotator program director in the National Science Foundation’s Documenting Endangered Languages Program.

Documenting Endangered Languages is a joint funding program of the NSF and the National Endowment for the Humanities to develop and advance scientific and scholarly knowledge about endangered human languages.

On the UNT faculty since 1992, Chelliah has received Documenting Endangered Languages funding in support of her research on Lamkang, spoken primarily in a region of Manipur in northeastern India. She is creating a searchable computer archive of texts in Lamkang and assisting native speakers to determine a standard writing system.

**Cyber Security**

Two Center of Academic Excellence designations recognize UNT as a leader in cyber security education and research. The university was one of only seven U.S. institutions to be designated a National Center of Academic Excellence in Information Assurance Education by the National Security Agency and the Department of Homeland Security for 2012.

UNT also reapplied successfully for the designation of National Center of Academic Excellence in Information Assurance Research, which it originally earned in 2004.

**Particle Accelerator**

The installation of a 15,000-pound, 3 million-volt particle accelerator expands the capabilities of UNT’s Ion Beam Modification and Analysis Laboratory, one of the top ion beam labs at any university in the country.

The National Electrostatic Corp. 9SH Linear particle accelerator was originally given to UNT by Texas Instruments. A number of different ions can be produced and accelerated in the lab and then used to characterize materials. The researchers implant ions into existing materials to alter the structure, and subsequently the properties, of the materials. The lab has worked with the National Institutes of Health to analyze the elemental composition of cancer cells.

The researchers also measure the composition of silicon wafers used in semiconductors to identify ways to produce more pure materials, and they are studying how to create materials that can absorb and emit light for use in renewable energy applications.

Floyd “Del” McDaniel, Regents Professor of physics and materials science, is the director of the lab, and Gary Glass, professor of physics, is co-director.
**Air Traffic Flow**

Yan Wan, assistant professor of electrical engineering, says managing air traffic flow is a combination of art and science. She is developing an analytical model that would account for the uncertainty of weather and traffic demand and would allow for greater automation in air traffic flow management, which would mean more efficiency and fewer delays. She is developing and testing her model with the support of the National Science Foundation and MITRE Corp.

Wan also received an NSF EAGER grant to examine broader issues related to dynamic decision-making in infrastructure systems under uncertainty. Her research into large-scale networks may eventually help computer scientists predict and understand the spread of computer viruses. Her recent work has been published in the *International Journal of Robust and Nonlinear Control* and *IEEE Transactions on Vehicular Technologies*.

**Science and Math**

Pam Harrell and Colleen Eddy, associate professors of teacher education and administration, were awarded a Texas Higher Education Coordinating Board grant for their Xtrem Science and Mathematics Institute.

The institute provides professional development to Fort Worth and Dallas ISD teachers in algebra I, geometry and middle school science and biology. It is designed to develop teachers who engage students with math and science content to enhance their learning experience.

Eddy studies teacher preparation and quality. Her research has been supported by grants of more than $5 million, including the NSF Robert Noyce Scholarship grant for which she is the principal investigator.

Harrell’s research explores teacher quality variables such as teacher content knowledge and the impact of pedagogical content knowledge on student learning. Her research has been supported by more than $8.5 million in grant funding.

**Schoenberg Collection**

A collection of original manuscripts, letters and photographs of famed composer Arnold Schoenberg, who created the revolutionary 12-tone technique of composition, was donated to the UNT College of Music.

The composer’s oldest living grandson, Arnold Greissle-Schoenberg, and his wife, Nancy Bogen, donated the works and attended a performance of Mein...
Lebenslauf, composed by Arnold Schoenberg’s son Georg, and performed by UNT students, alumni and faculty. The collection gives insight into one of the 20th century’s most innovative composers. It includes such items as errata sheets from Arnold Schoenberg’s famously difficult violin concerto.

Winspear Chair
UNT’s College of Music received a $1.5 million gift in spring 2012 from the estate of the late philanthropist and honorary UNT alumnus Bill Winspear. With the gift, the university established the endowed Margot and Bill Winspear Chair in Opera Studies, named in honor of Winspear and his wife, Margot. Paula Homer, director of the UNT opera program, was selected as the first person to hold the chair.

The endowed fund will be used for opera production costs, financial support for voice students in opera and other opera-related expenses. The opera program offers intensive training and performance opportunities to talented undergraduate and graduate music students through the College of Music.

Communication Design
A $2.5 million anonymous estate gift will support students, faculty and programs in the College of Visual Arts and Design and lead to a name change for one of UNT’s outstanding programs. When the gift is in place, it will produce more than $100,000 a year in scholarships and other student and faculty support and the communication design program will bear the name Jack Sprague Communication Design Program.

Sprague, a Professor Emeritus, taught at UNT for 20 years, including 14 years as director of the program, before retiring in 2009. He is now the education director at the Smart Center Santa Fe.

PEARL Project
The Department of Library and Information Sciences’ PEARL Project is enhancing the role of the public library in targeted rural communities in Texas.

Funded by the Robert and Ruby Priddy Charitable Trust, the project focuses on the small rural library as a community resource, a gathering place for people and a facilitator for community partnerships. It also provides library training and peer interaction for rural library staff.

Researchers are assessing how this collaborative model enhances the effectiveness of rural library service in Texas. Yunfei Du, associate professor, is the principal investigator for the project.

Performance Piece
Visual and performance artist Nick Cave finished his appointment as 2011-12 artist-in-residence of UNT’s Institute for the Advancement of the Arts with a collaborative performance piece, Heard. The piece featured horse-like Soundsuits — wearable sculptures that make sound when the materials brush together — made with the help of students in the sculpture, fibers and costume design programs. Cave’s Soundsuits have been lauded internationally.

Heard, featuring UNT student dancers corralled by UNT percussionists, was performed on campus in spring 2012. UNT’s Institute for the Advancement of the Arts advances excellence in the visual, performing and creative literary arts at UNT.

UNT students brought Heard to life in spring 2012. The performance piece was created by Nick Cave, 2011-12 artist-in-residence for UNT’s Institute for the Advancement of the Arts.
CREATIVE WRITING

Prominent Faculty Draw Talented Writers To UNT

BY JULIE WEST

A burgeoning literary scene flourishes in Denton, Texas, and writers across the country are paying attention. The University of North Texas is in the vanguard of creative writing programs in the nation. It is among a select group of schools — and the only university in the Dallas-Fort Worth area — offering a doctoral degree in English with a concentration in creative writing. Master’s students and undergraduates also can major in English with a creative writing concentration.

“If you want to do creative writing, UNT is the place to be,” says B.H. “Pete” Fairchild, an internationally recognized poet who says the caliber of the faculty and program lured him back to Texas to join UNT as a creative writing professor and senior poet in residence. “You choose to write because you can’t not write. You begin with a deep love for the art form, and after that it becomes the hard work of mastering the craft. I want students to above all learn that.”

Faculty Foundation

Notable faculty poets such as Fairchild, Bruce Bond and Corey Marks are one of the reasons students are drawn to the program. Their works have been praised by some of the most important critics in the nation and appear in respected literary journals. They also have received some of the highest awards in the field. Fairchild’s The Art of the Lathe, which won a Beatrice Hawley Award, was a finalist for the

From left, B.H. ‘Pete’ Fairchild, senior poet in residence, and Corey Marks, director of creative writing (shown at Paschall Bar in Denton) are among the award-winning faculty poets who are making a name for UNT’s program.
National Book Award and brought his work to national prominence. His *Occult Memory Systems of the Lower Midwest* won the National Book Critics Circle Award.

Bond, a Regents Professor of English, received the Texas Institute of Letters’ Best Book of Poetry award for *Radiography*, and Marks, associate professor of English and director of creative writing, won the Green Rose Prize for his latest book, *The Radio Tree*.

“I’m thrilled to be working with talented peers and students,” Marks says. “This feeds me as a writer. The students talk about having a wonderful sense of community here, and that’s true for me, too.”

Nonfiction and fiction also are mainstays of the program. Fiction writer and assistant professor Miroslav Penkov is receiving international honors and press for his book of stories, *East of the West*, including the highly sought 2012 BBC International Short Story Award and coverage on National Public Radio.

With support from UNT’s Institute for the Advancement of the Arts, Penkov says he returned to Bulgaria “like a marathon runner who must first train for months” to research the setting and story for his next book.

Nonfiction writer and associate professor Ann McCutchan also is receiving noteworthy attention and reviews for her two new books, *River Music — An Atchafalaya Story*, “an original blend of nature writing, music history, biography, journalism and memoir,” and *Circular Breathing*, a collection of personal essays.

Doctoral student Chelsea Wagenaar turned down a scholarship at another university to pursue creative writing with UNT’s well-known, and accessible, faculty writers.

“The opportunity for one-on-one mentorship was a big factor in my decision,” says Wagenaar, whose work was awarded the 2012 Pablo Neruda poetry prize from the journal *Nimrod*. “The professors support individual creativity.”

“We don’t have a literature faction on one side and a creative writing group on the other,” he says. “Our graduates will be qualified as multifaceted academics and teachers. I think that’s key.”

Jessica Hindman, a fourth-year Ph.D. student, says the cross training of genres has been invaluable in shaping her work.

“Teachers encourage literary experimentation. I might apply the creative nonfiction lens to traditional literature and analyze Chaucer’s ‘The Wife of Bath’s Tale’ as if it were a memoir written from the wife’s perspective. I’m constantly finding myself in exciting new literary terrain,” she says.

The advanced degree program is attracting many other talented students. Each year the English department has seen a significant increase in the number of advanced degree applications.

“Our graduate students are remarkable poets, story writers, nonfiction writers,” Marks says. “Many have already published, sometimes significantly.”

**Level of Dialogue**

Mark Wagenaar, a second-year doctoral student, is a case in point. Prior to coming to UNT, he received numerous national poetry awards, including the Yellowwood Poetry Prize and the Gary Gildner Award. His work is published in distinguished literary venues such as *The Southern Review* and *New England Review*.

Wagenaar first learned of the UNT program’s reputation through its signature journal, the *American Literary Review*. When one of his poems was published in the spring 2011 issue, he began investigating the possibility of pursuing a Ph.D. at UNT. A visit to campus convinced him.

“The enthusiasm for the program was obvious, among both faculty and students,” he says. “I am continually impressed by the level of dialogue.”

Bond says he learns daily from his students — “their questions, their inventions, their provocations.”
“I get to explore with them how poetry matters, how it binds us conceptually and emotionally to the world,” he says. “It is regenerating to see students come to this art and bring to it their own depths of character.”

Since being at UNT, Wagenaar has won the 2012 Felix Pollak Prize for his debut collection of poetry, *Voodoo Inverso*. As a research assistant, he is finalizing details for a 2013 publication of Bond’s poetry collection, *The Other Sky*, which pairs Bond’s poems with the evocative paintings of Aaron Wiesenfeld in what poet Stephen Dunn calls a “rare collaboration of sensibilities.”

Wagenaar also is working on materials for Bond’s critical book project about poetics, *Immanent Distance: Poetry and the Metaphysics of the Near at Hand*.

“His collection of scholarly writing has inspired me to consider the scope and value of my own essays as being a relevant extension of my poetry,” Wagenaar says. “I appreciate his insight.”

**Supporting the Arts**

The Visiting Writers Series, which brings esteemed authors to campus to give public readings, is another reason people associate literary excellence with UNT. English professors, students and community members benefit from dialogue with luminary literary figures such as Adam Zagajewski, Kathryn Harrison and Claudia Emerson.

UNT is a major contributor to the cultural environment of the region. The Dallas Institute of Humanities and Culture, WordSpace and the Writer’s Garrett are among area venues supporting exchange. Literary aficionados also enjoy the student-initiated Kraken Reading Series directed by doctoral students Kyle McCord and Justin Bigos, which focuses on supporting new talent.

Ben Fountain, lauded fiction writer, is a former guest author of the Visiting Writers Series who was impressed with the vitality of UNT’s creative writing program.

“If you look at the literary accomplishments of the faculty — especially at the kudos the younger faculty members are getting with their first and second books, and the dedication they bring to teaching — it is clear to me that UNT has the talent and energy to power the program into the top tier nationally,” Fountain says.

In 2012, the creative writing program introduced the first annual UNT Rilke Prize, named after the Bohemian-Austrian poet Rainier Maria Rilke. The $10,000 award, which recognizes a book written by a mid-career poet that demonstrates exceptional artistry and vision, was presented to poet, novelist and University of Michigan professor Laura Kasischke for her book *Space, in Chains*. The prize aims to raise awareness of talented writers in the field and bring focus to the program.

“I was just at a poetry reading in San Francisco and a couple of writers came up and asked about the award,” Bond says. “Clearly the prize has helped in raising UNT’s national visibility, and it validates vision and artistry — qualities that are key to a healthy culture.”

A new award also has been created for exceptional graduate students of poetry, thanks to a generous donation from Denton arts patron Paul Voertman. The Voertman Poetry Prize for Students was endowed by the Academy of American Poets, an affiliation that lends added prestige.

The prizes, poetry series, hire of a senior-level poet and other innovations build on the solid foundation of the program and help fuel its reputation.

“Al of these ingredients are blending and strengthening each other in a pretty interesting way,” Holdeman says. “UNT is in the right place at the right time.”
Breast cancer, which strikes about one of every eight American women, has a five-year survival rate of only 15 percent if diagnosed at an advanced stage. Survival rates improve to nearly 90 percent with early diagnosis, but even the most thorough biopsies can miss cancer during the very early stages.

Arup Neogi, professor of physics at the University of North Texas, is working as a member of the Bio/Nano-Photonics research cluster on an early cancer detection technique that uses nanoparticles.

“Our method using photonics is more sensitive than current methods,” he says. “We would be able to distinguish a single malignant cell from healthy cells.”

Neogi’s work is just one way UNT researchers are developing tools that could soon revolutionize the healthcare industry. Scientists from fields including biology, chemistry, geography and engineering are working on research that could improve the understanding of the human body and human health, and so lead to better medical treatments and technologies.

Cancer Studies

Neogi’s nanomedicine research not only has potential for diagnostic applications, but also may be promising for treatment of cancers and infections.

When cultured with cell samples from cancer patients collected at the University of Texas Medical Branch in Galveston and Northwestern University, the small zinc oxide particles Neogi works with will enter the cancer cells but not
Arup Neogi, professor of physics and member of the Bio/Nano-Photonics research cluster, studies the use of zinc oxide nanoparticles in the detection and treatment of cancer.

The particles naturally emit light in the presence of infrared light, allowing researchers to quickly identify cancerous cells using non-linear microscopes, which use infrared light to probe deep into tissues.

The presence of malignant cells can be determined just minutes after the culture is created. However, Neogi and his team discovered that if the samples are left for 15 to 20 minutes, the cancer cells can be totally destroyed by the zinc oxide particles.

“We hypothesize that the nanoparticles are antimicrobial in nature and when they break up, they create free radicals that destroy the malignant cells,” Neogi says.

“Only the cancerous cells are affected in the tests we’ve conducted, so we see great potential in using nanoparticles as a cancer treatment that would be less destructive than current treatments that kill both cancerous and healthy cells.”

Neogi, whose grants include funding from the National Science Foundation and the Japan Society for Promotion of Sciences, works closely with Shimane University in Matsue, Japan, on the project. He is seeking collaborations with clinical physicians to further develop nanomedicine-based cancer treatments.

His team also is investigating ways to safely deliver the nanoparticles to sites of infection. He says infections contracted in hospitals are an increasing problem.

“Due to the excessive use of antibiotics, many microbes are resistant to drugs,” Neogi says. “My team is investigating whether an individual’s own blood platelets could be used to penetrate resistant microbes to deliver nanoparticles loaded with drugs directly to the infected site.”

If enough funding is secured, Neogi predicts his diagnostic technology could be implemented in labs across the country within two or three years. The treatment element of his research will take longer to be implemented since the materials will need to undergo stringent testing.

 Toxicology and Pharmacology

A few blocks from the physics lab where Neogi is investigating the future of cancer treatment, Guenter Gross, Regents Professor of biological sciences, listens to neuronal networks in his lab.

In 1977, Gross and his team were the first researchers in the world to record electrophysiological data from nervous system cell cultures using thin film electrode arrays. He was able to record cellular activity using the small glass plates embedded with microelectrodes and coated with a microscopic layer of tissue.

“Everyone knew you could put electrodes into the brain and measure function, but if you wanted to look at smaller networks of 500 to 1,000 cells, you would destroy the tissue by inserting electrodes,” Gross says.

“A single cell doesn’t mean that much. It is the group that forms the basic functional unit of the brain, and it is the group dynamics we know the least about. So the idea was, if you cannot bring electrodes to cells, then why not bring the cells to the electrodes.”

Originally, Gross thought his new technique would primarily be used to study network theory — how cells function in groups — but soon the team discovered additional applications.

“The network theory work is ongoing, but the more practical applications have been for pharmacology and toxicology,” Gross says.
“We never expected these networks to behave so similarly to nervous tissues in the body, but they are very representative of the parent organism.”

The networks have been used to test antiserums for the military, determine the effectiveness and toxicity of drugs that could slow Alzheimer’s disease, and study ways to minimize damage caused by alcohol — the networks show signs of intoxication at about the same concentrations that humans do.

“The networks on microelectrode arrays are very effective screening platforms that can save time and money during drug development and reduce the number of animals used for this purpose,” Gross says.

Kamakshi Gopal and Ernest Moore, professors in the Department of Speech and Hearing Sciences, are collaborating with Gross to assess the potential benefits of various drugs for treating tinnitus, a disorder characterized by ringing in the ears. They also are testing the neurotoxic effects of cisplatin, a commonly used cancer treatment drug known to induce hearing loss and tinnitus, and studying protection against neurotoxicity with antioxidants.

Gross also has been tapped to work on a number of projects for the U.S. Department of Defense.

Most recently, he worked with colleagues at Southern Methodist University, Case Western Reserve University, Vanderbilt University and the University of Texas at Dallas on a multi-million dollar grant aimed at developing next-generation prosthetic limbs.

The researchers investigated optical recording and stimulation techniques to replace less reliable metal electrodes.

Gross conducted toxicity tests on the biosensors that had been developed and studied their effect on neuronal function. The project has concluded, but Gross hopes the team will secure additional funding to further develop more efficient prosthetic interfaces with the nervous system.

**Sparking an Interest**

Pamela Padilla, an associate professor of biological sciences and a member of UNT’s Developmental Integrative Biology research cluster, is investigating human health and disease through the lens of *C. elegans*, millimeter-long roundworms with insulin-signaling pathways similar to those in humans.

Using an NSF CAREER award, Padilla studies how the worms are able to survive in extremely low oxygen environments. The award, the most prestigious offered by the NSF for young investigators, supports early career development activities of teacher-scholars.

Typically, *C. elegans* can survive in environments of less than 1 percent oxygen, but recently Padilla and her students discovered the worms can no longer survive in anoxic conditions when fed a diet high in carbohydrates.

She hopes studying mutant *C. elegans* that are able to survive low-oxygen conditions even when given a high-carbohydrate diet could lead to new treatments for diabetes or oxygen-deprivation related diseases.

Padilla also is using her award to get students interested in research.

“It is difficult to do discovery-based learning in the classroom, especially in...
large science classes, so many courses end up with recipe-like labs,” Padilla says. “My CAREER award included an education component, so I developed a lab module for our genetics course that allows students to do a more open-ended genetic screen.”

Undergraduate student Iran Roman took the course last spring and says it opened his eyes to the possibilities of research. Now Roman, who is triple majoring in biology, music theory and German, is working with a graduate student in Padilla’s lab to better understand the role of specific genes in glucose processing in \textit{C. elegans}.

He also is searching for genes that are important in responding to oxygen deprivation with four other undergraduates who became interested in joining the lab after taking the genetics course.

Each year, 300 students take the course, which implements discovery-based learning. The project was profiled in \textit{Science} magazine in October 2012.

\textbf{The Tools to Succeed}

Successful medical research typically requires a substantial infrastructure. UNT has invested in facilities to advance the capabilities of all of its researchers, including those interested in health.

UNT’s Center for Computational Epidemiology and Response Analysis was founded in 2008. The faculty overseeing the center are computer scientist Armin Mikler, medical geographer Joseph Oppong and biologist Sam Atkinson.

Together, they use technologies such as geographic information systems to aid in the prediction and analysis of disease spread in a given population. The center uses computer modeling, simulation and visualization to improve the allocation of public health resources. Researchers affiliated with the center also collaborate with researchers at the UNT Health Science Center.

UNT’s Metabolomics and Metabolic Signaling Pathway Research Laboratory, overseen by Vladimir Shulaev, professor of biological sciences, opened last fall.

The lab is one of the top facilities of its kind in the world and will allow researchers to use mass spectrometry and liquid chromatography to analyze the chemical makeup of living organisms.

The university also has recruited faculty experts who can help make sense of the massive amounts of data being produced by the scientific community. Qunfeng Dong, a member of UNT’s Computational Chemical Biology and Developmental Integrative Biology research clusters, has a joint appointment in biology and computer science.

Dong works as a bioinformatician, developing algorithms and software to analyze complex data sets such as DNA sequencing information. Through several National Institutes of Health projects, he is collaborating with medical doctors studying bacteria in the human body.

“DNA sequencing and other technologies have revolutionized scientific research, but there have to be tools to comprehend the multitudes of data being produced,” Dong says.

“Tools like bioinformatics are helping make groundbreaking medical research possible.”

\cite{Padilla2013}
Self-regulation to resolve conflicts, Fuhrmann says the evidence points to an expansion of state-sponsored policing activities in the early centuries of the Common Era.

Drawing on art, archaeology, administrative documents, Egyptian papyri, laws, religious texts and ancient narratives, he gives an overview of Roman imperial policing practices, including the role of Augustus and the expansion of policing under his successors — a new means by which the state could control its subjects. The book is the first general analysis of Roman policing in more than a century and the first ever in English.

2 \ Policing the Roman Empire: Soldiers, Administration and Public Order

Christopher J. Fuhrmann, associate professor of history

Although the popular theory is that Roman society relied on kinship networks or self-regulation to resolve conflicts, Fuhrmann says the evidence points to an expansion of state-sponsored policing activities in the early centuries of the Common Era.

The book explores the history, development and meaning of the “archivolted” portals adorning many of the rural ecclesiastical structures of 12th-century western France and northern Spain.

Abel argues that the concentrically stepped and ornamental archivolts likely used sculptural imagery accessible to both monks and parishioners. She suggests that the form reflects the kinetic elements inherent to pilgrimage and crusade, as well as cultural interaction with the Islamic courts of Spain and the politics of the Peace of God movement, with its emphasis on relic processions.

Abel is now working on a book about the monastic development of a canal system around Maillezais Abbey in western France.

3 \ Latinos in the New Millennium: An Almanac of Opinion, Behavior and Policy Preferences

Jawar Singh, Indian Institute of Information Technology, Design and Manufacturing; Saraju P. Mohanty, UNT associate professor of computer science and engineering; Dhiraj K. Pradhan, University of Bristol

This guide to static random access memory bitcell design and analysis is meant to help meet challenges such as process variation, leakage and temperature instability for complementary metal oxide semiconductor devices and emerging devices.

The authors highlight the most popular SRAM options for reducing process variability, an ongoing challenge in large memory arrays. They also include trade-offs for achieving the best design and provide techniques and experimental simulation setups.

Mohanthy’s research in design for very-large-scale integration is funded by the National Science Foundation and the Semiconductor Research Corp.

4 \ Robust SRAM Designs and Analysis

Timothy Montler, professor of linguistics

Working with the elders, educators and tribal councils of the Klallam Tribes in northwest Washington and British Columbia, Montler has compiled a comprehensive dictionary with more than 9,000 entries for the endangered language of Klallam.

He began working with the tribes more than 30 years ago, and in 2007, the Klallam Language Program asked that he work on a dictionary. He received funding through the Documenting Endangered Languages program, a cooperative program of the National Endowment for the Humanities and the National Science Foundation.

He has a new grant to work on a dictionary and electronic text archive for Saanich, a language spoken on southern Vancouver Island.

5 \ Klallam Dictionary

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6 \ Miniature Forests of Cape Horn: Ecotourism with a Hand Lens

Bernard Goffinet, University of Connecticut; Ricardo Rozzi,
UNT professor of philosophy and religion studies; Lily Lewis, doctoral student who participated in UNT’s Chile study abroad course; William Buck, New York Botanical Garden; and Francisca Massardo, University of Magallanes

This guide provides information on the “miniature forests” in the southernmost end of Chile — a world hotspot of biodiversity for liverworts, mosses and lichens that surround the trees and rocks.

The bilingual book with full-color photos describes the architecture, life cycles and identification of the taxonomic groups of these organisms. It also includes a natural history narrative and introduces the ecotourism experience of using a magnifying glass or camera to appreciate the highly diversified organisms. Rozzi is the director of UNT’s Sub-Antarctic Biocultural Conservation Program in Chile.

7 \ Conservation Biology and Applied Zooarchaeology (University of Arizona Press)

Steve Wolverton, UNT associate professor of geography, and R. Lee Lyman, University of Missouri-Columbia, editors

This book is designed to show how zooarchaeology, a sub-field of archaeology and ethnobiology, can inform conservation science. It offers case studies using animal remains from archaeological and paleontological sites to provide information with implications for wildlife management and conservation biology.

Case study topics include the marine ecology of shellfish and fish, potential restoration sites for Sandhill Cranes and conservation of animals such as American black bears. Essays also address issues of political and social ecology. Wolverton is an ecologist and archaeologist specializing in the paleozoology of North America during the Holocene epoch.

8 \ The Destiny of Modern Societies: The Calvinist Predestination of a New Society

(Haymarket Books)

Milan Zafirovski, professor of sociology

Part of the Studies in Critical Social Sciences series, this book extends previous analyses of the impact of Calvinism to explore how it has determined most contemporary social institutions in America, including those in the political, civic, cultural and economic areas.

It applies the idea of the destiny of societies or nations to American society in particular. Zafirovski, whose research interests include political sociology and economy, social stratification and theory, also is the author of Liberal Modernity and Its Adversaries and The Enlightenment and its Effects on Modern Society.
Zhenhai Xia is working to perfect synthetic dry adhesives based on the Spiderman-like prowess of geckos. Jaehyung Ju has helped to reinvent the tire by taking out the air and is now studying ways to make airless tires safer, more fuel efficient and even greener.

Stevens Brumbley is engineering plants — specifically sugarcane — to produce a range of bioplastics, which will provide alternatives to petroleum-based plastics. Ruthanne Thompson is showing schools how using wind and solar power technology can save money. And while she’s at it, she’s analyzing what makes the best urban-scale wind and solar power system to help power neighborhoods.

Researchers at the University of North Texas are working to develop technologies and products designed by nature or designed with nature in mind. They work in many disciplines — from engineering and plant science to environmental science and philosophy — and together are distinguishing UNT as a premier place for green research.

The university’s strong environmental legacy began in the 1930s with water research. Now, with solutions-based research clusters and innovative degree programs in areas such as mechanical and energy engineering, UNT is standing out in new ways.

Nature-inspired Products

If Spiderman were real, his hands and feet would work like gecko feet, says Xia, a member of the Materials Modeling research cluster and the Center for Advanced Scientific Computing and Modeling at UNT. Geckos can climb any vertical or horizontal surface, sticking to it and detaching easily while their feet stay clean.

The quick-release adhesion is attributed to the unique structure of the millions of microscopic hairs on their feet and van der Waals force, which allows them to generate a strong adhesion force to defy gravity but easily detach from a surface by peeling their feet away.

Xia was part of a team of researchers, led by Liming Dai of Case Western Reserve University, who made gecko-inspired dry adhesive that was 10 times stronger than gecko feet by mimicking gecko footpads using carbon nanotubes. The palm-sized adhesive was estimated to be strong enough to support a 200-pound man climbing a wall, but easy to remove and re-adhere upon many reapplications. Their research was published in Science magazine. Because of the tubes’ strength and flexibility, they also could be used as structural material in such things as car parts and baseball bats.
Stevens Brumbley, associate professor of biological sciences, works at the new Research Greenhouse Complex at UNT’s Discovery Park. He is engineering sugarcane to create bioplastics as an alternative to petroleum-based plastics.
Now, Xia, associate professor of materials science and engineering, is further exploring the hair of gecko feet. His team has discovered a self-cleaning mechanism in the feet and, based on the finding, will create artificial gecko feet for testing.

The research could be used to help create dry synthetic adhesives that would be strong and reusable, remaining sticky and clean after each application. The advanced adhesion technology could be used for applications such as bonding material in the biomedical field or electrical components. He is hoping the research also could lead to cheaper ways to fabricate the adhesive.

Xia focuses on biomimetic research, which looks to nature to design materials and devices. Nature has had millions of years to perfect the design of animals and plants, he says, and from it we can learn to create new, better and greener materials.

“As scientists, we need to solve big problems,” Xia says. “If we solve big problems, we make life easier and help protect the environment.”

**Fuel Cells and Tires**

Xia also has been researching how to improve clean-energy technology for cars and power plants. He was part of a team that had a breakthrough in fuel cell technology, discovering that nitrogen-doped carbon nanotubes are nearly four times better than platinum as a catalyst and could eventually replace it in fuel cells. These findings also were published in *Science*.

Xia says the high cost of platinum is one of the major barriers for fuel cell commercialization. Carbon is easy to find and cheap to mass produce, so it is a more renewable resource than platinum. Carbon nanomaterial also is a better catalyst for oxygen reduction — a key chemical reaction that generates electricity in fuel cells — so it can make a clean technology better and cheaper. Xia is now working to better understand the catalytic mechanisms in fuel cells.

In the mechanical and energy engineering department, tires are getting an overhaul too. Ju, an assistant professor and researcher in UNT’s PACCAR Technology Institute, contributed to the development of the airless or non-pneumatic tire. On the market within perhaps a decade, the tires are made of polyurethane and rely on a structure of flexible spokes for stiffness instead of air. Because the tires won’t go flat, they have a longer shelf life, meaning fewer would end up in the landfill compared to conventional rubber tires.

Ju has analyzed the airless tire’s rolling resistance to see how it handles energy loss. He has found that airless tires have a 10 percent lower rolling resistance than traditional tires, which translates into better fuel efficiency and a safer road experience.

Now Ju is working to improve the design and safety of the airless tire. He is developing porous polyurethane composites that could lead to a 20 percent lower rolling resistance. He also is applying his research in cellular topology, the lattice geometries that control the stiffness and strength of cellular materials, to improve the design.

His research team members are using a multiscale modeling and design technique that covers the materials design and structural performance of a real tire model. He says they are close to matching the safety of the conventional tire.

Motivated by collaborations with faculty in UNT’s Renewable Bioproducts research cluster — including Nandika D’Souza, professor of mechanical and energy engineering and materials science, and Sheldon Shi, associate professor of mechanical and energy engineering — Ju envisions creating an airless tire made of eco-friendly material such as nanowhisker-reinforced natural rubber. He also is looking at ways to use recycled rubber tires for creating other products such as building materials.

“UNT is focused on sustainable technology,” Ju says. “It’s great to collaborate with other researchers who have expertise in this area.”
Plant-based Plastic

Brumbley, associate professor of biological sciences in the Renewable Bioproducts cluster, is working at the new Research Greenhouse Complex at Discovery Park, UNT’s 300-acre research park. He is engineering C4 grasses such as sugarcane to create more environmentally friendly plastic.

Most of the plastic in our lives is made from petroleum-based resources, but that is starting to change as major manufacturers are driving demand for green plastics, Brumbley says. Bioplastics are made from renewable resources, have a lower carbon footprint and are, in some cases, biodegradable.

The C4 grasses are ideal crops for bioplastics because they efficiently use sunshine and carbon dioxide to produce biomass, are abundant and can easily be re-engineered, Brumbley says. Certain kinds of grasses also are drought tolerant and will grow on lands not suited for food crops.

Sugarcane is one of the more advantageous C4 grasses for bioplastics because it is already grown and produced for sucrose. Where there is sugarcane production, there is infrastructure to grow the cane, harvest the biomass, transport it to a central processing plant and crush it. Waste from the production helps provide the energy to run the mill.

To engineer the sugarcane, Brumbley isolates genes from various bacterial species that make the necessary chemicals and transforms the sugarcane so these genes become part of its genome. Bioplastics or precursors are then made in the cells of the sugarcane plants and accumulate there until harvested.

He says the field is in its infancy but growing rapidly, and bioplastics have huge potential for use in everything from packaging to electronics, automobiles and airplanes.

“In addition to reducing petroleum use, bioplastics could displace a large amount of plastic that is either going into landfills or showing up as part of an ongoing pollution problem,” he says. “They also can be a key solution for corporations dealing with legislation on products that don’t biodegrade and aren’t being recycled.”

More Efficient Technology

As the demand for smaller, more energy-efficient electrical devices grows, electrical engineers must determine how to best fit all the electrical components into the devices. Gayatri Mehta, assistant professor of electrical engineering, and student researchers have turned the problem of efficiently mapping electrical components into a web-based computer game, Untangled (at untangled.unt.edu), which could lead to new algorithms.

The game unlocks the secrets of human intuition by requiring players to arrange various series of blocks on a graph. By mathematically analyzing the graphs of the top-scoring players, the team hopes to develop new algorithms to help engineers develop the next generation of cell phones, medical devices and other electronics. Mehta’s National Science Foundation-funded research could lead to smaller, more energy-efficient devices. The game has been named a finalist in the NSF-sponsored International Science and Engineering Visualization Challenge, one of the top 10 in the Games and Apps category.

Peter Collins, assistant professor of materials science and engineering, is focused on developing high-strength, lightweight alloys that might be used to create lighter vehicles that are more fuel efficient while still retaining their design strength levels. As director of the UNT site of the Center for Advanced Non-ferrous Structural Alloys — an NSF-sponsored Industry/University Cooperative Research Center — Collins is part of a team working to develop lightweight alloys used in airplanes and cars.

The work of Mehta and Collins could play an essential role in improving the efficiency and performance of everyday technology, leading to positive impacts on the environment.

Outreach-based Research

At UNT’s Environmental Education, Science and Technology Building, Thompson, an environmental scientist, can...
tell at any given moment how much energy the 3.5 kwh wind turbine and four-panel solar array are producing to help power the greenhouse there.

Both a practical energy source and a demonstration project, the system is Thompson’s brainchild, part of her SMART Schools initiative funded by a grant from the State Energy Conservation Office. Through the initiative, Thompson, associate professor of biological sciences, used research and modeling to help eight Texas schools or school districts implement technologies to save energy and educate students about energy conservation. The grant also helped fund a wind and solar system at UNT’s Zero Energy Laboratory, a unique facility to research renewable energy technologies.

Thompson’s applied science is equal parts research and education. She creates math and science lessons based on the data from the two systems. And she is analyzing which system is better at producing energy and offsetting energy costs so that she has strong research to encourage the use of urban-scale systems. She also goes to local schools to teach students how to reduce water consumption. She’s found they are taking the lessons to heart and back to their families.

“I try to make connections through real-world applications,” Thompson says. “This not only helps students see the effects of their actions, it can help make future scientists.”

As an environmental anthropologist, James Veteto, assistant professor of anthropology, also does outreach-based green research. He directs the Southern Seed Legacy program, working to collect and conserve Southern heirloom seeds and their histories with a particular focus on seeds threatened by genetic erosion or extinction. The program serves as a seed reserve for plant varieties in danger of becoming extinct and as a memory bank documenting the cultural history of Southern heirloom plants.

Veteto and other researchers help to identify at-risk crops important to regional biodiversity and sustainable agriculture, then work with farmers to preserve them and to promote local seed exchanges. They want to reverse further loss in the diversity of crops in the American South.

Conservation

UNT’s reach extends around the world. Through the Sub-Antarctic Ecosystems and Biocultural Conservation research cluster, UNT researchers are partnering with researchers in Chile to protect and support the ecologically fragile Cape Horn reserve — one of the world’s last remaining pristine wilderness areas.

The cluster includes researchers from UNT’s nationally recognized programs in environmental philosophy, biological sciences and ecological sciences.

Co-directed by faculty members Ricardo Rozzi and Eugene Hargrove in philosophy and James Kennedy and Jaime Jiménez in biological sciences, the program combines cultural and philosophical perspectives with empirical scientific research. Through the UNT-Chile Field Research Station, students and faculty conduct hands-on research on climate change, habitat conservation and language loss.

These initiatives are helping UNT become known as a hub for green research in everything from renewable energy technologies to bioproducts and conservation, says Geoff Gamble, vice president for research and economic development.

“Many of the challenges of the 21st century have to do with minimizing human impacts on the environment, and UNT researchers are tackling these challenges through innovative, collaborative research and outreach,” Gamble says.

“We are attracting researchers who are leading the way in these fields and students who want to learn from these innovators.”
Zero Energy Research

New Lab Provides Training Ground

The university officially unveiled the UNT Zero Energy Laboratory at Discovery Park, its 300-acre research park, in 2012. The new state-of-the-art laboratory — the only one of its kind at a U.S. academic institution — will advance UNT’s research capabilities, solidifying the university as a leader in zero-energy research and instruction.

“There are very few other places for students to get hands-on experience working with the green technologies that will power our future,” says Yong Tao, chair of the Department of Mechanical and Energy engineering and PACCAR Professor of Engineering, who spearheaded the design and creation of the lab. “This facility is a great resource for our students, researchers and industry partners.”

The 1,200-square-foot space was designed, with input from industrial partners, to test energy technologies such as solar, geothermal and wind systems that produce enough energy to power a building, helping it achieve a net-zero consumption of energy. In many cases, the technologies even create excess energy to return to the power grid.

The lab includes solar panels, a building energy monitoring and control system and a rainwater collection system. Outside, the facility has a residential-scale wind turbine.

American House

Tao oversaw a similar project at Florida International University, where he was associate dean of the College of Engineering and Computing. He also initiated and served as the director of the Future House USA project, an initiative that brought together academics, builders, industry sponsors and lobbyists to create a 3,200-square-foot net-zero energy house.

The American House was built in Beijing and displayed during the 2008 Olympic Games. UNT furthered its relationship with Chinese researchers by signing a memorandum of understanding with Future House Real Estate Co. Ltd., a research institution in Beijing, in 2011.

Last summer, Tao took a group of students to Beijing and Shanghai to study alternative energy. They studied renewable, solar, wind, geothermal, biomass and zero-energy buildings. They also visited the world’s leading manufacturer of solar panels and lived in the Beijing American House for a week.

Hands-on Research

Rambod Rayegan, a visiting assistant professor in the Department of Mechanical and Energy Engineering, is overseeing the research in the Zero Energy Laboratory. Postdoctoral researchers and graduate students are studying areas such as whole-building energy performance model validation, the long-term impact of the interaction of soil and ground source heat exchangers, alternative HVAC systems for zero-energy buildings, innovative thermal storage for solar energy and the role of human behavior in energy usage.

The lab was designed so that structures such as doors, windows and supporting energy-efficient equipment can be expanded and exchanged to facilitate research. Nandika D’Souza, who has a joint appointment in the Department of Mechanical and Energy Engineering and the Department of Materials Science and Engineering, hopes to use the facility to test materials made out of the fibers of the kenaf plant in Texas and others from Qatar and Brazil.

The bio-based construction materials would be more environmentally friendly than traditional building materials and could reduce energy usage.

D’Souza is working with Tao and other faculty on the project with a National Science Foundation Partnership for Innovation Grant. She and Tao are members of the Renewable Energy and Conservation research cluster, and she oversees the Renewable Bioproducts research cluster.

Both groups will take advantage of this unique facility to conduct cutting-edge sustainability and energy research.
STUDENT RESEARCHERS

Benjamin Baron
Service learning

Baron, a doctoral student in information science, is developing an understanding of graduate students’ perceptions and expectations in international service learning settings, particularly those within the Department of Library and Information Sciences.

Each year, students participate in a school library assessment and improvement project in another country. Baron has worked on projects in Ukraine and Peru and most recently in Russia. He conducted research on how the students viewed their experiences against their expectations, with the goal of improving future projects.

He plans to present findings with Barbara Schultz-Jones, associate professor of library and information sciences, at the 2013 iConference in Fort Worth.

Baron also is interested in information-sharing behavior and perceptions of expertise in ad-hoc social networks and is studying the potential influence of personality on learning environments and social networks. As a master’s student, he was named the College of Information’s outstanding student in library science.

Favyen Bastani
Computer algorithms

Bastani won a Barry M. Goldwater Scholarship — considered to be among the country’s most prestigious scholarships for students planning careers in math, science and engineering — for his research in computer science. He also was a semifinalist in the 2012 Intel Science Talent Search and a regional finalist in the 2011 Siemens Competition, two of the most prestigious science competitions for high school students.

He was a student at the Texas Academy of Mathematics and Science, a two-year residential program at UNT that allows talented students to complete their freshman and sophomore years of college while receiving the equivalent of high school diplomas.

Bastani worked with Hui Ma of Cisco Systems on algorithms to solve complex optimization problems. He also worked in the UNT laboratory of Yan Huang, associate professor of computer science and engineering. With Huang and supported by an NSF Research Experiences for Undergraduates grant, he worked on designing, data mining and real-time algorithms to improve future transportation systems and published several papers.

Bastani now attends the Massachusetts Institute of Technology and is interested in a career in computer science research or possibly web applications development.

Phillip Davis
Entrepreneurial intentions

Davis, a doctoral student in management, won the Best Doctoral Paper Award for 2012 from the U.S. Association for Small Business and Entrepreneurship. The award is sponsored by the International Journal of Entrepreneurship and Innovation.

The paper, which he wrote with Whitney Peake, assistant professor of management, explores the impact of emotional intelligence and political skill on undergraduate business students’ entrepreneurial intentions. The results suggest that students who possess high political skill could have stronger
intentions to start new businesses. The research also identifies other skills that may be useful to entrepreneurs as they continue to seek ways to influence others to benefit their businesses — a finding that could potentially affect the curriculum of entrepreneurship education programs.

Davis plans to graduate in May 2014 and hopes to teach on the college level and conduct research in the areas of strategy and entrepreneurship.

Jonathan Dombrosky
Subsistence patterns
Dombrosky, a senior anthropology major and Honors College student, won the Society of Ethnobiology’s 2012 Undergraduate Ethnobiologist Award. He has been studying animal remains from archaeological sites with Steve Wolverton, associate professor of geography, focusing on subsistence patterns in the Northern Rio Grande region of New Mexico from 1300 to 1600 A.D. The work will help answer questions about what types of animals humans hunted, how people procured and processed animals and how these practices have changed over time.

Dombrosky also works as a National Science Foundation research assistant helping further methodology for extracting protein food residues from pottery found at archaeological sites. He plans to pursue a doctorate in environmental science at UNT.

Monica Gastelumendi
Music education
Gastelumendi, a master’s student in jazz studies, received a $10,000 Philanthropic Educational Organization International Peace Scholarship for a nonprofit music organization that will train music teachers and provide better music education for children in Peru.

Gastelumendi is originally from Peru, which has a rich folkloric music tradition but provides little arts education. She started a female choir at her high school in Lima, Peru, and, at age 19, formed a big band — now a nonprofit music organization called Jazz Jaus. She traveled to the United States to obtain a degree in music. She works as a consulting professional for the nonprofit organization that UNT alumna Carolina Araoz runs as president.

Gastelumendi has studied vocal jazz with Jennifer Barnes, assistant professor of jazz studies, and Rosana Eckert, an adjunct in jazz studies, and plans to explore arranging Peruvian music with jazz.

Emily Klement
Hispanic transfer rates
For her doctoral dissertation, Klement found that the presence of Hispanic faculty on community college campuses was the greatest factor of those she studied in determining whether Hispanic students will transfer to four-year universities.

Klement analyzed data from the Texas Higher Education Coordinating Board on 50 Texas community colleges. Her mentor was Beverly Bower, professor of counseling and higher education, Don A. Buchholz Chair for Community Education and director of the Bill J. Priest Center at UNT.

Klement graduated in August with her doctorate in higher education. She is the dean of the Bowie and Graham campuses of North Central Texas College.
**Hagar Mohamed**

Postpartum depression

Mohamed, a master’s student in interdisciplinary studies with a concentration in women’s studies, received a $10,000 International Peace Scholarship from the Philanthropic Educational Organization for her research. She is conducting a research project in underprivileged communities in rural Egypt that screens women for postpartum depression, investigates risk factors and identifies the best interventions.

Mohamed studied pharmacy as an undergraduate in the German University in Cairo, but she was inspired to change disciplines when she saw a USAID-funded project in her hometown of Aswan, Egypt, that strives to empower women as healthcare workers and as patients.

Her research is conducted under the mentorship of Sandra Spencer, principal lecturer in English. Mohamed also plans to investigate the effects of anti-depressant medications on female hormones under the guidance of Duane Huggett, assistant professor of biological sciences.

She will graduate in 2013 and plans to submit grant proposals to conduct research on postpartum depression on a large scale in Egypt.

**Eric Norman**

Sustainable tourism

Norman was one of UNT’s first graduates in international sustainable tourism. He earned his master’s degree in May 2012 through the university’s joint degree program with CATIE in Turrialba, Costa Rica. He also earned a bachelor’s degree in hospitality management with a minor in business at UNT in 2008. As part of the capstone internship for the master’s program, he worked on a feasibility study, business plan and strategic plan for a study abroad program based on sustainability. He also investigated the need for a methodology to develop sustainable tourism products.

After graduating, he returned to CATIE as a research assistant and coordinator for the Sustainability Seminar Series, the study abroad program he had created. This summer the series will expand to two sessions covering sustainable agri-business and sustainable tourism.

Daniel L. Spears, associate professor of hospitality and tourism management and graduate advisor, was Norman’s mentor and instrumental in his decision to return for a graduate degree. In the future, Norman plans to contribute to tourism development projects.

**Amanda Quay**

Aquatic toxicity

Quay, a student at TAMS, received the Barry M. Goldwater Scholarship, and she made the semi-finals of the 2012 Intel Science Talent Search and the 2011 Siemens Competition, the nation’s leading original research competition in math, science and technology for high school students.

Quay was recognized for her research, under the mentorship of William Acree, professor of chemistry, that calculates the concentration at which a given drug molecule exhibits toxicity. It provides insight into which pharmaceutical compounds pose an environmental risk to aquatic life. She also proposed a possible solution for decomposing the compounds — photocatalytic reactions, or sun decomposition.
David Reilly

Novel electrowetting solar cells

Reilly researched electrowetting-controlled optofluidic solar cells with Jiangtao Cheng, associate professor of mechanical and energy engineering.

They investigated a novel solar concentration system without mechanical moving parts, which allows for extensive residential deployment of concentrated solar power.

Compared to traditional silicon-based photovoltaic solar cells with mechanical tracking mechanisms, the electrowetting-based technology generates about 70 percent higher green energy at 50 percent of the cost.

For his senior design project, Reilly is working with a student team to redesign a tail rotor gearbox housing for the Bell 429 helicopter. He also took part in the National Science Foundation’s Research Experiences for Undergraduates program.

A member of the UNT Honors College, he will graduate in 2013. He plans to pursue a master’s degree in mechanical engineering and then work at a national laboratory or in research and development at an aerospace company.

Amy Schade

Bacteria and viruses

Schade was one of 61 students in the nation selected for the Howard Hughes Medical Institute’s 2012 Exceptional Research Opportunities program.

In the summer program, she worked with a University of Wisconsin-Madison researcher to study virus-host interactions and human papillomavirus.

At UNT, she looked at the immunity of certain bacteria to viruses under the mentorship of Lee Hughes, assistant professor of biology.

Schade also was a member of UNT’s nationally recognized debate team and won the 2011 National Junior Division Debate Tournament as part of a two-student team.

After graduation, she plans to pursue her doctorate and possibly work as a professor or a researcher at a government agency.

Yuying Shen

Social determinants of health

As a doctoral student in sociology, Shen received the International Research Fellowship — one of six in the world — to spend four months at Freiburg University in Germany to explore globalization and social science knowledge circulation in China.

Working with sociology professor Dale Yeatts, she focused her research for her dissertation on the social determinants of health. She received a scholarship from the International Sociological Association to present her research at a 2011 ISA workshop in South Africa.

She earned her doctorate in August and is now a visiting assistant professor of sociology at Texas Tech University.

Quay is now studying chemical engineering and minoring in Arabic at Stanford University. She hopes to work on sustainable water systems in underdeveloped rural communities in the Middle East and North Africa.

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In the sand-strewn battlefields of Afghanistan, military investigators will have a new tool to fight crime. A high-tech, portable workstation — no bigger than a CD player — will allow them to immediately identify the tiniest substances between the ridges of a fingerprint.

Instead of sending samples to a sophisticated off-site lab, investigators can manipulate them on the nano-scale with mass spectrometry, getting more accurate findings and saving time and money. With just 15 minutes of training, an investigator can test a piece of wood, fabric or any number of substances, looking for traces of improvised explosive devices, drugs or other illicit materials.

Guido Verbeck, associate professor of chemistry at the University of North Texas, developed the small-scale forensic workstation to be deployed to Afghanistan this summer using a grant from the U.S. Department of Defense Battlefield Forensic Program. Because the device, called the nanomanipulator, can be encoded to look for a particular substance, suspects can be identified and captured more quickly.

"Each substance and individual produces unique chemical signatures, so investigators analyzing samples may be able to tell who’s touched an explosive device or a drug stockpile because the chemistry is connected," Verbeck says. "It’s an easily understood device that helps solve complicated problems.”
Solving Mysteries

From military battlefields to police departments and campus laboratories, UNT forensic science experts such as Verbeck are helping to solve mysteries and cut down on crime.

Renowned forensic anthropologist Harrell Gill-King, director of the UNT Laboratory of Forensic Anthropology and co-director of the Center for Human Identification at the UNT Health Science Center, used his expertise to identify victims of the World Trade Center and Oklahoma City bombings, the Space Shuttle Columbia disaster and Hurricane Katrina. He is researching the effects of intranasal and intraostral cocaine and methamphetamine use on the cranium, face and dentition.

Teresa Golden, professor of chemistry and director of UNT’s undergraduate forensic science program, is working with the Health Science Center to determine how concentrations of metals stored in bones can interfere with obtaining a DNA profile. Her lab has developed a technique to synthesize artificial bone as a standard for comparison.

Other experts, like Edward Hueske, principal lecturer in criminal justice, use applied research to help police understand crime scenes. Hueske studies bullet deflection, debunking the myth that a bullet travels in a straight line through objects.

"Each time it hits something, it’s going to be deflected slightly in all probability," says Hueske, who worked as a forensic scientist at police crime labs before joining UNT. "That causes confusion for crime scene investigators who don’t have this background."

Last summer, Hueske traveled across the country training officials at police agencies, including the New York Police Department, about bullet deflection and other topics. He has consulted with prosecutors and defense lawyers in criminal and civil cases and set up a criminalistics certificate program at UNT for future police administrators, detectives, crime scene investigators and attorneys.

Now, Hueske is using bovine samples to research what happens when a bullet hits soft tissue, muscles, organs and small bones. He also is examining pseudo-high velocity impact blood spatter.

"Police officers need to understand the language of forensic science," Hueske says. "That’s where I provide the link."

Interpreting and Repairing DNA

When attorneys need help interpreting DNA evidence, they often call Robert Benjamin, associate professor of biology and a prominent courtroom DNA identification expert. Since 1988, Benjamin has helped prosecutors and defense lawyers at both the state and federal levels with more than 200 criminal and civil cases involving DNA profiling and analysis. His applied research involves reviewing DNA reports and studying how the DNA evidence was collected and tested.

"DNA is unbiased, but it can be misinterpreted," Benjamin says.

If a knife was used in a murder and someone’s DNA is found on it, is that person the killer? What if the suspect had been preparing dinner before the murder?

"Once you decide the results are correct, you have to get into the significance of them," Benjamin says. "DNA gets around in a lot of ways, so you have to ask, is there another explanation?"

One of Benjamin’s doctoral students in molecular biology at UNT, Angie Ambers, is working with Health Science Center researchers to explore methods to repair damaged DNA with a grant from the National Institute of Justice.

A victim’s DNA in skeletal remains or a killer’s DNA under a victim’s fingernails can’t easily be analyzed and identified if the evidence has been damaged or destroyed by sunlight, heat, humidity or other environmental factors.

Ambers and principal investigator Bruce Budowle at the Health Science Center are working to repair damaged DNA in bloodstains and bones and in samples that a suspect has tried to destroy using bleach.

"It all boils down to improving our chances of going to court with adequate information to prosecute someone," says Ambers, who earned a master’s degree in forensic genetics from the Health Science Center and has a master’s in criminology.

The researchers are using a cocktail of different enzymes to repair varying types of damage. They’re also studying whole genome amplification — a method that may improve recovery of the low quantities of DNA often encountered in forensic samples.

Ambers conducts her research as a DNA analyst at the Institute of Applied Genetics and at the Department of Forensic and Investigative Genetics at the Health Science Center, as well as in the lab of Benjamin, her major professor at UNT.

"This research has the potential to provide families with resolution," Ambers says. "I enjoy coming to the lab every day knowing that the work I’m doing can make a difference in the real world."
As a major public research university dedicated to providing students with an excellent educational experience, the University of North Texas continues to attract faculty members committed to innovative research, scholarship and creativity.

Award-winning faculty with national and international reputations in their fields — spanning science, technology and the arts — ensure that the university continues to create new knowledge, discovering what will be taught in the classrooms of tomorrow. Members of UNT’s collaborative, cross-disciplinary research clusters carry out high-impact research addressing scientific, environmental and societal problems.

UNT’s faculty members also are dedicated mentors, translating their research and creativity into excellent teaching and learning experiences for students. The following provides a snapshot of new faculty throughout the university.

**Jim Williams**  
**Distinguished Research Professor of Materials Science and Engineering**  
A member of the National Academy of Engineering, Williams is one of the world’s leading authorities on titanium alloys, and he also studies nickel alloys and stainless steel. Most recently, he served on the faculty and previously as the dean of engineering at Ohio State University. He also served on the faculty and as dean at Carnegie Mellon University. His career in the aerospace industry included work for Boeing and Rockwell, and he was the general manager of the materials and process department for GE’s aircraft engine business. His team introduced several new materials and worked to decrease titanium defects in aircraft turbine engines. He has played a significant role in attracting, managing or conducting research projects from numerous federal agencies, including NASA and the National Science Foundation, totaling $50 million. He has been principal investigator or co-principal investigator on projects totaling $20 million, and he holds two patents on titanium-based alloys.
Laila Amine
Assistant Professor of English
Amine specializes in 20th century African American and African Diaspora literatures. She recently co-edited a special issue on memory and globalization for the journal Culture, Theory and Critique. Her work also has appeared in Black Camera and Postcolonial Text. Amine’s book project, The Making of Algerian Paris: Colonial Legacies and Transnationalism, uncovers how the Algerian war and its legacies shaped representations of Paris in African American, French and Maghrebi cultural texts. Before joining UNT, she was a chancellor’s postdoctoral research associate in the Department of African American studies at the University of Illinois at Urbana-Champaign. She taught African American and African Diaspora studies, comparative literature, American studies and French at Indiana University and at the University of California in Santa Barbara.

Cornelia Caragea
Assistant Professor of Computer Science and Engineering and Library and Information Sciences, Member of the Knowledge Discovery from Digital Information Research Cluster
Caragea is a computer scientist with expertise in machine learning and data mining. She has developed and applied an abstraction-based approach to learning compact classifiers from text and protein sequence data and researched the identification of important sites in proteins using sequence information. She also has designed scalable algorithms for document and citation recommendation in large digital libraries and studied subjectivity and sentiment analysis in online forums. She was previously a postdoctoral scholar at Pennsylvania State University and a doctoral assistant at Iowa State University. Her work has been published in leading data mining journals and conference proceedings such as the Association for the Advancement of Artificial Intelligence, the International Conference on Data Mining and BMC Bioinformatics.

Wonbong Choi
Professor of Materials Science and Mechanical and Energy Engineering, Member of the Bio/Nano Photonics Research Cluster
Choi invented the carbon nanotube field emission display, which was featured in Science magazine. He also helped develop the single molecular DNA-sensor, high efficiency lithium-ion battery based on carbon nanotubes, graphene based flexible field emission display, vertical CNT-field effect transistor and CNT-based non-volatile memory devices. Choi was a project manager and senior research scientist at Samsung and a leading scientist in the Carbon Nanotubes for Tera-level Device project and has earned more than $1 million per year in funding. He previously worked at Florida International University. He was awarded the Materials Research Society Medal and is a fellow of the society. He holds more than 80 patents and is the author of the book Graphene and 180 articles and proceedings.
**Carol Anne Costabile-Heming**  
Professor and Chair of the Department of World Languages, Literatures and Culture  
Costabile-Heming studies 20th and 21st century German literature and culture, focusing on East German literature and its legacy, literature of the post-unification period and Berlin literature. She has written *Intertextual Exile: Volker Braun’s Dramatic Re-Vision of GDR* and been published in *The German Quarterly, Monatshefte* and *Colloquia Germanica*, among others. She was the founding chair of the Department of World Languages and Literatures at Northern Kentucky University, an associate dean at Missouri State University and on the faculty at Penn State University and Southeast Missouri State University. She also served as president of the American Association of Teachers of German and was named its 2012 Post-Secondary Outstanding German Educator. She has received grants from the International Research and Exchanges Board, American Council of Learned Societies and the National Endowment for the Humanities Summer Seminar.

**Vladimir P. Drachev**  
Associate Professor of Physics  
Drachev is widely recognized for his works in nanophotonics and nanotechnology and in particular for his experiments on optics, nonlinear optics, spectroscopy of plasmonic nanostructures and their applications in biosensing and metamaterials. He was a junior and senior scientist at the Institute for Semiconductor Physics in Novosibirsk, Russia; a visiting scientist at New Mexico State University; and a senior research scientist at Birck Nanotechnology Center and School of Electrical and Computer Engineering at Purdue University. Drachev is an associate editor for *Optical Materials Express* and a senior member of the Optical Society of America. He has had more than 80 papers published in refereed journals and holds four patents. His current project, “Spectroscopic Ellipsometry of Optical Metamaterials,” is funded by the Air Force Research Lab.

**Paula Gaetano-Adi**  
Assistant Professor of Studio Arts  
Gaetano-Adi is an artist and researcher working in sculptures, performances, interactive installations and robotic agents. She coordinates the new media area in the College of Visual Arts and Design and is part of UNT’s Initiative for Advanced Research in Technology and the Arts research cluster. Using the human and non-human body as a point of departure, her work deals with different cultural studies of technoscience, its relation to human subjectivity and how that can be reflected through art. Her works have been presented internationally in Europe, Asia and South America, and she has received funding from the National Endowment for the Arts, the National Ministry of Culture in Argentina and the Telefonica Foundation in Spain, among other organizations. She has worked at the Rensselaer Polytechnic Institute in Troy, N.Y., the University of California at Los Angeles and two universities in Buenos Aires.
Panayiotis Kokoras
Assistant Professor of Composition Studies
Kokoras studied composition with Yannis Ioannides and Henri Kergomard, and classical guitar in Athens. He earned his Ph.D. in composition at the University of York. His works have been commissioned by institutes and festivals in France, Germany, the Netherlands, the United Kingdom and the United States and have been performed in 150 cities around the world. His sound compositions — ranging from acoustic to mixed media, improvisation and tape — employ what he calls holophonic musical texture and explore influences of the electroacoustic studio on acoustic instrumental compositions and vice-versa. His works have received more than 50 distinctions and prizes in international competitions, been selected by juries in more than 130 international calls for scores and appeared in 34 CD compilations. He taught at the Technological and Educational Institute of Crete, the Aristotle University of Thessaloniki and the University of Wales’ Thessaloniki campus.

Brian McFarlin
Assistant Professor of Kinesiology, Health Promotion and Recreation
McFarlin has received more than $2.5 million in research — including funding from industry sources and the National Institutes of Health — to improve health and reduce disease risk. He is studying the role the immune system plays in chronic disease and how to use nutritional countermeasures and exercise to prevent this effect. He also is working to understand and prevent immune-suppression following a strenuous bout of exercise in an extreme environment. He was an associate professor at the University of Houston and is a fellow of the American College of Sports Medicine and The Obesity Society. He is president of the Texas chapter of the American College of Sports Medicine, serves as associate editor for the International Journal of Exercise Science and has been published in Pediatrics, Comparative Medicine, the British Journal of Nutrition and The Journal of Immunology.

Gwendelyn Nisbett
Assistant Professor of Strategic Communications
Nisbett is researching mediated social influence in a political context. Specifically, she is investigating how voters and the democratic electoral process are being influenced by micro strategies — such as data mining, social media and direct marketing — and macro-message strategies that use the media to create and maintain a campaign narrative. Before starting an academic career, Nisbett worked for 10 years in campaign politics. She took part in political strategic communication at the national, statewide, coordinated campaign and local levels. She also managed six state house and senate races in Missouri, North Carolina, Oklahoma and Virginia. Her work has been published in Communication Monographs, Mass Communication & Society and the Journal of Political Marketing.
Marianna Strzelecka  
Assistant Professor of Sustainable Tourism  
Strzelecka, whose background is in sustainable tourism development, is interested in community participation in tourism decision-making and ways to empower community stakeholders, using methodologies such as participatory geographic information technologies. Her research has covered rural tourism development in transitioning economies and the role of non-governmental organizations in sustainable rural development. Her previous work focused on community development through sustainable tourism in a post-Communist setting in Wielkopolski Park Narodowy in Poland and rural community empowerment in the context of the European Union. She plans to incorporate tourism and community studies and natural management in research on the socio-ecological system of communities in Costa Rica, where UNT has a joint international degree program in sustainable tourism with CATIE.

Karen Toussaint  
Assistant Professor of Behavior Analysis  
Toussaint studies how to improve treatment outcomes of children diagnosed with an autism spectrum disorder. She conducts research related to the treatment of inhibiting behaviors that may interfere with social interaction and learning — such as echolalia (repeated vocalizations) and stereotypy (repetitive movement). She recently completed a postdoctoral research fellowship at the University of Nebraska Medical Center’s Munroe-Meyer Institute in which she evaluated the effectiveness of video modeling technology to decrease echolalia during a language acquisition program. Her work published in the Journal of Applied Behavior Analysis and Behavior Analysis in Practice includes ways to reduce self-injurious behavior and to identify when response interruption will reduce problem behavior. She also has been published in Research in Developmental Disabilities.

Brian Sauser  
Associate Professor of Marketing and Logistics, Member of the Complex Logistics Systems Research Cluster  
Sauser brings extensive expertise in the analysis of system maturity assessment, and his work has been nationally recognized and adopted by groups with NASA, the U.S. Army, Northrop Grumman and Lockheed Martin. He taught at the Stevens Institute of Technology and directed the Systems Development and Maturity Laboratory there. He served as project specialist with ASRC Aerospace at NASA Kennedy Space Center and managed a NASA-sponsored center at Rutgers University conducting collaborative research for human space exploration. At the Johnson Space Center, he worked on technology solutions for human exploration of the moon and Mars. He is a NASA Faculty Fellow, a senior member of the Institute of Electrical and Electronics Engineers, editor-in-chief of the Systems Research Forum and an associate editor of the IEEE Systems Journal. His grants and contracts total more than $6 million.
The road Rebecca Weber took to graduate study at the University of North Texas included three years of undergraduate research, marriage, motherhood, a bachelor’s degree — and a National Science Foundation Graduate Research Fellowship. She is earning her doctorate in chemistry at UNT with the help of the prestigious fellowship, which rewards students with a three-year stipend for graduate research and education.

And she’s not alone. Jennifer Williams, Jessica Rimsza and Jody Huddleston also are among UNT graduate students who have earned the competitive fellowships. They represent a growing number of women bringing about innovations in science and technology, the environment and human health.

It was the research of Angela Wilson, Regents Professor of chemistry and 2012 fellow of the American Association for the Advancement of Science, with UNT’s nationally known Center for Advanced Scientific Computing and Modeling, that drew Weber to UNT, and it was Wilson who encouraged her to apply for the fellowship.

“I have met few other students who conduct meaningful research, maintain outstanding grades, stay active in science organizations and manage to be a mother of young children all at the same time,” Wilson says.
Weber is helping Wilson’s group develop theory in the fast-growing field of computational chemistry, which uses computers to model molecules, molecular properties and chemical reactions — and saves time and money compared to traditional approaches.

“In searching for a new industrial catalyst, for example, a computational chemist can screen many, many more possibilities, narrowing down potential compounds to a handful, rather than having to investigate hundreds,” Weber says.

She is working on a method known as MR-ccCA that allows researchers to more accurately model large molecules. She plans to pursue a university teaching career that will allow her to conduct further research and be a mentor.

“Dr. Wilson pushes her students to stay active in research and the academic community, keeping our names out there so that we have better chances at careers,” Weber says. “Her support has been great.”

Environmental Applications

For Williams, who is working on a master’s degree in electrical engineering, the NSF fellowship made it possible to pursue interests in environmental monitoring systems, sustainable design, and outreach in the science, technology, engineering and mathematics fields. She earned her bachelor’s degree in electrical engineering at UNT and says she’s had the chance to use that knowledge in environmental settings through her work with Miguel Acevedo, Regents Professor of electrical engineering.

One of those opportunities included consulting with the Lewisville Lake Environmental Learning Area on the reintroduction of bobwhite quail to the area.

“We brainstormed on a project to keep the quail cool in the Texas heat and discussed the use of remote monitoring systems to provide data on its effectiveness,” Williams says.

Acevedo is the project leader of the Texas Environmental Observatory at UNT, which uses weather stations throughout the region to provide web-based environmental data for the public. In a project to expand the observatory, Williams is researching its monitoring equipment, purpose, functionality and communication links as she works to develop her graduate thesis.

And as a summer research assistant for UNT’s NSF-funded Research Experiences for Teachers in Sensor Networks, she helps high school teachers in the STEM fields conduct research on campus.

Her interests helped make her a good fit for the fellowship.

“Jennifer wants to apply her engineering skills to environmental problems and is determined to devote her academic career to help society and improve STEM education,” Acevedo says. “That combination is highly appreciated by funding agencies.”

Williams says her UNT undergraduate advisors and professors helped her to gain the research experience needed to qualify for the fellowship.

“Dr. Acevedo and many other professors have been excellent role models every step of the way,” she says.

“I want to make a difference locally and globally, and now I have the opportunity to do that.”

Materials Research

Research focused on improving technology gave Rimsza an edge in earning one of the prestigious fellowships. She’s using the award to study the use of organosilicate glasses for separating the electronic charges that run through computer chips, with a goal of making the chips faster, smaller and more reliable.

She is pursuing her research as a doctoral student in the laboratory of Jincheng Du, associate professor of materials science and engineering, where she is investigating the etching of these materials at the atomic level using advanced computer simulations.

Understanding how the materials are affected by etching, which is used in the manufacturing of chips, will help to ensure that they function effectively in electronics after processing, Rimsza says.

“Using computer simulation and modeling to solve problems in fundamental materials research is significant in keeping U.S. technology competitive globally,” Du says. “I think Jessica’s focus and valuable research experiences made her a competitive candidate for the fellowship.”

Rimsza found her way to UNT thanks to a recommendation from her undergraduate advisor at the University of Arizona. She developed liquids for semiconductor cleaning there in the chemistry lab of Rene Corrales and her research was published in the Journal of Computational and Theoretical Chemistry.

Corrales — who had worked with Du at the Pacific Northwest National Laboratory — encouraged Rimsza to continue her research at UNT and apply for the NSF fellowship.

“He mentioned that UNT had a new materials science and engineering Ph.D. program and that Dr. Du would be great as my student advisor,” Rimsza says, adding that her first year at UNT has been rewarding not only because of supportive faculty.

“UNT has put a lot of money and effort into research facilities, which makes the academic experience here even more fulfilling.”
Disease Tracking

Huddleston came to UNT to study jazz, but she found her niche in a science lab. She earned her bachelor’s degree in geography from UNT as an Honors College student and a scholar in the Ronald E. McNair Post-baccalaureate Achievement Program.

The federally funded program provides first-generation and underrepresented students with research opportunities and faculty mentors to encourage them to pursue doctoral degrees and college teaching careers.

She credits the McNair program along with James Duban, director of UNT’s Office for Nationally Competitive Scholarships, and faculty mentor Joseph Oppong, professor of geography, for providing the training and help she needed to earn the NSF fellowship.

Huddleston’s undergraduate research included mapping HIV/AIDS late testers in Texas, individuals who developed full AIDS symptoms within a year of being identified as HIV positive. Today, she is using her fellowship to earn a doctorate in environmental science.

Her new project examines tick-borne disease in Texas and what factors — such as climate, land cover and habitat fragmentation — lead to areas where disease-causing bacteria or viruses among ticks are more prevalent.

“The goal is to use resources like satellite imagery, population data and aggregated disease data to map areas in Texas that can be considered of higher risk to humans,” she says.

Oppong says the research will provide much-needed information for county and regional health departments for planning appropriate interventions to prevent and control disease.

“Jody’s work is exceptional,” he says. “She is a huge inspiration and mentor for other students.”

After completing her doctorate, Huddleston plans to help future students gain a passion for research.

“I was able to start doing research early in my college career,” she says, “because there were professors and advisors at UNT who showed me I didn’t need to wait until graduate school to become involved.”

NSF Graduate Research Fellows are supported by their mentors. From top, Jessica Rimsza and Jincheng Du, associate professor of materials science and engineering, study organosilicate glasses for use in semiconductors; Jody Huddleston and Joseph Oppong, professor of geography, help control disease by mapping high-risk areas; and Jennifer Williams and Miguel Acevedo, Regents Professor of electrical engineering, focus on the environment.
The longer a civil war lasts, the less likely either side is to win. T. David Mason, Johnie Christian Family Peace Professor at the University of North Texas, says past statistical research on more than 140 civil wars finds strong evidence for this.

In a study published in the June 2012 issue of Civil Wars applying the findings to the war in Iraq, Mason points to the possibility of a negotiated peace settlement among insurgent groups, militias and the Iraqi government, encouraged and enforced by a multinational peacekeeping and peace-building mission.

“However remote the prospects for negotiating an end to the conflict and building sustainable peace, there are far more precedents over the last 20 years to give us hope for this option,” he says.

“And a well-crafted peace settlement would be preferable to the alternative outcomes to that war.”

Mason is one of nine UNT faculty members who are using statistical and computational methods to identify factors that influence political violence and human security. They conduct their research as part of the Castleberry Peace Institute — the only peace science research institute in the southern U.S.

Directed by Mason, it was founded in 2010 with the nonprofit organization Peacemakers Inc., created by retired journalist Vivian Castleberry. It sponsors research and educational programs on the causes and consequences of war and peace, democratization, economic development and respect for human rights.
Faculty experts in peace studies include, from left, Idean Salehyan and Jacqueline DeMeritt, who have served as fellows with the Texas Project for Human Rights Education, and T. David Mason, Johnie Christian Family Peace Professor and director of the Castleberry Peace Institute.

The emphasis on peace studies in UNT’s Department of Political Science goes back to 1998, when the university created the Johnie Christian professorship. Christian was a peace activist whose estate endowed the position.

The late Steven Poe, the first political science faculty member to hold the professorship, created the department’s interdisciplinary minor and certificate programs in peace studies in 2000, making UNT the first university in Texas and the Southwest to offer the minor. Graduates work in foreign service, international and human rights law, the Peace Corps and other organizations promoting human rights and conflict resolution.

To build on its existing strengths in peace studies, UNT formed the Human Security, Democracy and Global Development research cluster, housed in the Castleberry Peace Institute. The cluster also includes economics and geography faculty who study poverty, economic development, global health and international trade.

Their work puts UNT among the top 10 U.S. universities for peace science research when considering faculty quality and number of articles in peer-reviewed journals, says Idean Salehyan, associate professor and coordinator of the cluster. In 2011-12 alone, cluster faculty published 36 articles.

Rainfall and Refugees

Many of the researchers study factors that lead to the onset of civil and international war and factors that contribute to an earlier, less destructive resolution and more durable peace. Faculty also create research tools to statistically analyze these factors.

For example, Salehyan and former faculty member Cullen Hendrix developed the Social Conflict in Africa Database to study the link between environmental factors and political instability in African nations.

Their research is supported by a grant from the U.S. Department of Defense, which they received as associates of the Climate Change and African Political Stability Program at the Robert S. Strauss Center for International Security and Law at the University of Texas at Austin. The database provides information on more than 8,000 incidents of political instability from 1990 to 2012.

Salehyan and Hendrix discovered that changes in rainfall influence the prevalence of social conflict in African nations. In recent decades, conflicts — from small disputes between citizens over land rights to full civil wars — were more common in either extremely wet or extremely dry years rather than in years with normal rainfall. Violent social conflicts, such as riots and civil wars, have been more common in extremely wet years.

Salehyan notes that forecasts predict more rainfall variability for Africa in the future, raising the possibility of an increased number of conflicts. The research was published in 2012 in the Journal of Peace Research.

Associate professor Michael Greig used a different database — 46 post-war peacekeeping missions since the end of World War II — to understand conditions that affect the length of peacekeeping missions. He discovered that peacekeepers are likely to stay longer if the conflict resulted in a large number of refugees, and peacekeeping missions with security mandates and set objectives also tend to be longer term.

“Peacekeepers are more likely to continue the mission as the costs and risks of peacekeeping diminish. If major powers in the U.N. are not supportive of a peacekeeping mission, it is likely to end quickly without the objectives being reached,” says Greig, who charted and analyzed mediation efforts for post-World War II conflicts for the book International Mediation, published in 2012.

International Justice

The research of UNT’s peace studies faculty has attracted students from across the country. Doctoral student Angela Nichols was an undergraduate at Pennsylvania State University when she read UNT professor James Meernik’s research on societal peace in Bosnia and the U.N. International Criminal
Tribunal for the Former Yugoslavia, or ICTY. Nichols worked as a Serbian and Croatian linguist in the U.S. Army from 1999 to 2004.

“Although I wasn’t deployed to the region, I worked on military intelligence missions related to the conflict,” she says. “I was planning to be an international human rights attorney, but after I read Dr. Meernik’s research, I wanted to work specifically with him.”

For her doctoral dissertation, Nichols is researching the role of transitional justice in post-conflict societies. In 2009, she visited the ICTY in The Hague, Netherlands, as part of the International Law, Peace and Justice class taught by Meernik and associate professor Kimi King.

Meernik and King have been conducting research on the ICTY since 2001. They are currently working with the ICTY Victims and Witnesses Section to examine the impact on the witnesses of testifying at an international tribunal, through interviews with 200 to 250 ICTY witnesses.

“Many believe the experience of testifying has a healing effect on victims and witnesses, but that has never been tested with rigorous empirical analysis so we don’t know for certain this is the case,” Meernik says.

“We also want to investigate the opinions of those who have testified before the ICTY regarding its impact on peace, justice and reconciliation in the region.”

Analyzing the Evidence

In addition to working with Meernik, Nichols researched women’s roles in post-conflict societies with assistant professor Jacqueline DeMeritt and Eliza Kelly, who was then an undergraduate international studies major.

The research received financial support from the Boone Family Foundation of Dallas as part of DeMeritt’s 2011-12 fellowship with the Texas Project for Human Rights Education. Salehyan was named a fellow of the prestigious program for 2012-13.

Specifically examining the impact of female political leadership, women’s presence in the labor force and the ratio of female-to-male literacy rates, DeMeritt, Nichols and Kelly looked at the duration of peace following civil wars in 76 nations from 1975 to 2003.

The analysis showed that nations with greater female representation in legislatures and more equal male-to-female literacy ratios are less likely to relapse into civil war than other nations.

“We know from other studies that women tend to prefer peaceful policies over violent ones. When women are elected, they represent the women in their constituency, and they appear to stand up for what those women believe,” says DeMeritt, who next plans to examine the effect of female representation on ongoing genocides.

Mason says providing international leaders with evidence-based solutions to prevent political violence, improve governance and address global poverty is the goal of peace science research at UNT.

“We’re not in the advocacy business, and we’re not philosophers for peace,” he says. “We’re committed to peace studies as a science, and government organizations are paying more attention to what we’re discovering.”

“We’re committed to peace studies as a science.” — T. David Mason, Johnie Christian Family Peace Professor and director of the Castleberry Peace Institute
I’m excited to lead UNT’s research efforts during what is a time of great momentum. UNT is making strides as a research institution while making the quality of the educational experience even better. Our investments in faculty and infrastructure are leading to important gains in competitive funding and attracting distinguished researchers to UNT.

UNT had about $44 million in federally reported research expenditures during fiscal year 2012, a 40 percent increase from fiscal year 2010. Our base competitive research awards are increasing steadily each year, even as federal earmarks and stimulus funding have all but disappeared. This shows that more of our faculty members are seeking and qualifying for competitive funding, furthering the impact of their research, scholarship and creative activity and contributing to the quality of our students’ education.

Part of what is driving this growth is the work our faculty researchers are doing in our collaborative research clusters. These clusters are maturing, and many of our faculty researchers are working on new developments and technologies. The clusters are helping UNT stand out to prospective faculty and students in areas such as plant sciences, renewable energy technologies, bioproducts and computational research. UNT also is attracting world-class talent to our already strong community of researchers. We have two National Academy of Engineering members, and a National Academy of Sciences member is joining us this year.

We’re also continuing to broaden our infrastructure with facilities such as the Zero Energy Laboratory and the Research Greenhouse Complex at Discovery Park. Our Nanofabrication Analysis and Research Facility — which includes a 3,000-square-foot clean room — will come online this year. The facility, partially funded by the National Science Foundation, will be an advanced university laboratory for materials synthesis and analysis and micro/nano device fabrication.

Together, these advances give UNT momentum as we build our national reputation as a research institution. And, importantly, they are enhancing our academic environment, giving our students a stronger, more rigorous learning experience.

Geoff Gamble
Vice President for Research and Economic Development
Researchers at the University of North Texas can do more complex calculations and work with larger data sets thanks to the Talon High-Performance Computing System. The supercomputer, with 200 terabytes of storage and an operating speed of 20 teraflops, has helped UNT expand its reach in computation-based research. Faculty members in computational chemistry, computational epidemiology, bioinformatics, physics, mathematics, biology, materials science, and mechanical and energy engineering — as well as experimental music and art — are among its many users.