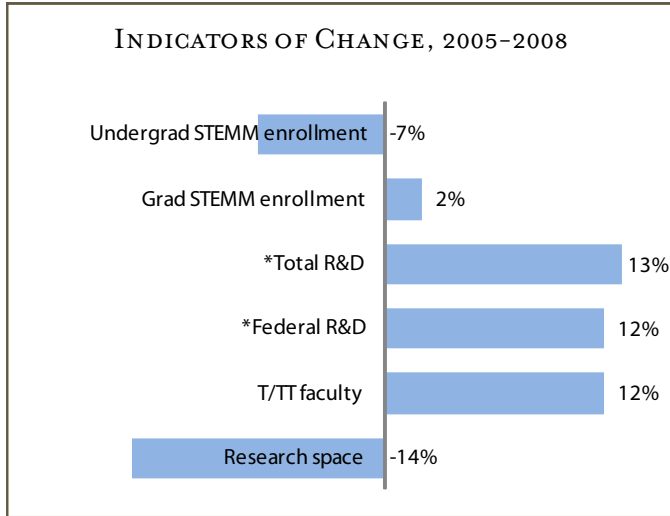


# THE UNIVERSITY OF TEXAS AT ARLINGTON

The UT System has responded to the challenge set forth by the Rising Above the Gathering Storm (RAGS) report and has committed \$147 million to strengthen competitiveness at UT Arlington. Initial indicators of the impact of these investments are presented here, organized according to the four critical elements described by RAGS: education, research and technology development, competitive capacity, and incentives.



STEMM = science, technology, engineering, math, and medical/health  
 \* % Change, 2005-2007. Source: NSF.

## UT ARLINGTON AT A GLANCE

Student enrollment in STEM, 2008	
Undergraduate (STEMM % of total)	4,481 (24%)
Graduate (STEMM % of total)	1,967 (32%)
New faculty recruited (2005-2008)	
STARs faculty recruited	6
ETF research superiority award recipients	1
Physical space (square footage)	
Teaching	787,000
Research	204,000
Increase in total sq. ft. through initiative	14%
New STEM-related endowments (2005-2008)	\$2 million
Research expenditures, 2007	\$33 million
Federal research expenditures, 2007	\$20 million
Intellectual property revenue, 2005-2008	\$1.7 million
U.S. patents issued, 2005-2008	15
Licenses/options executed, 2005-2008	21
Start-up companies, 2005-2008	9

## Education

Under the UT System Competitiveness Initiative, UT Arlington increased its academic physical space by 82,000 square feet, or 8 percent. Increases in classroom space helped open the door to a new degree program in nursing. The Doctor of Nursing Practice is designed to train nurse practitioners within one of the 20 largest schools of nursing in the U.S. UTA has also provided tuition discounts for all STEM Ph.D. students in order to be more competitive in attracting high-quality doctoral students and is planning to expand levels of financial support for these students.

*Approximately 1/4 of all undergraduate and 1/3 of all graduate students enrolled at UT Arlington major in science, technology, engineering, and math.*

UT Arlington is focused on increasing educational opportunities in science, technology, engineering, math, and medical/health (STEMM) fields to overcome the workforce shortfall predicted in the RAGS report. Approximately one-quarter of all undergraduate and one-third of all graduate students enrolled at UTA major in STEMM fields. Undergraduate enrollment in STEMM has decreased by 7 percent at UT Arlington since 2005 while overall



undergraduate enrollment has declined by 2 percent. This decline in STEMM enrollment is less than the 5 percent growth in undergraduate STEMM enrollment at all UT System academic institutions. An enrollment management plan is being implemented to significantly improve retention and graduation rates at the undergraduate level. Undergraduate student enrollment in nursing programs has remained relatively stable at near-capacity levels, declining by 1 percent. New online delivery models and additional funding will more than double the spaces available for new students in the next few years. Enrollment in health professions, however, increased 41 percent, adding an additional 29 undergraduate students. This trend is significantly higher than the 6 percent increase in undergraduate health professions enrollment at all UT System academic institutions.

Graduate enrollment in STEMM fields has increased 2 percent since 2005, adding an additional 43 students. This is less than the overall growth of 6 percent in graduate enrollment at UTA. The rate of increase at UTA is considerably less than the 9 percent increase of STEMM graduate students enrolled at all UT System academic institutions while graduate enrollment for all majors increased by 4 percent. UTA is identifying ways to improve this situation and is in the process of hiring a graduate retention and completion coordinator in the office of graduate studies to track and benchmark retention and graduation rates at the graduate level. Graduate student enrollment in nursing programs increased substantially, by 28 percent, compared to the 12 percent increase at all UT System academic institutions. Graduate enrollment in health professions has varied over the past four years, ranging from 135 to 162 students, with current enrollment approximately equal to 2005. In contrast, graduate health professions enrollment showed a steady increase of 12 percent at all UT System academic institutions.

## Research & Technology Development

UT Arlington has shown a firm commitment to enhancing research activity and the reputation of the university. One way to increase research productivity and scholarship is to actively recruit experienced researchers to the institution. UTA has recently hired a substantial number of new faculty by creating new positions and replacing vacant ones, ultimately revitalizing the research enterprise. The institution also is ensuring that both new and existing faculty have the resources they need to produce outstanding results. The “excellence initiative” was established to identify resources that can provide incentives for new and existing faculty by raising funds for research support and salary enhancements for outstanding research faculty. These efforts will galvanize UT Arlington’s goal of significant improvement in institutional rankings over the next decade.

With a focus towards economic development and by building strong partnerships (e.g., local chambers of commerce, business incubators, and industry), UT Arlington’s research provides real life application to the technologies developed in its labs. Industry-financed research expenditures at UTA have increased 112 percent while peers have averaged a 6 percent decrease between 2005 and 2007.

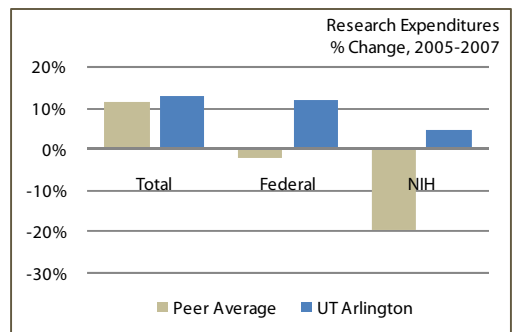
UT Arlington is dedicated to forming strong partnerships with federal agencies and industrial representatives. One of the activities that UTA has undertaken to achieve this goal is an innovative electronic research search engine. Under the leadership of the Vice President for

Research, the institution has developed a search engine for all research related resources at UTA, including faculty expertise, equipment, laboratories and research groups, research centers, research facilities, and technologies and

*To facilitate research collaborations, UT Arlington has developed an innovative search engine that allows corporate representatives, faculty, and others to search for research related resources such as faculty expertise, equipment, labs, facilities, technologies, and patents.*

patents. The intent of the electronic search engine is to facilitate research collaborations by allowing corporate representatives, faculty, and other interested parties to easily and effectively conduct direct searches for university resources. UT Arlington has invited other institutions to join this search engine concept, called the Collaborative Partnership, which allows inter-institutional searches of research resources. There are currently six academic institutions that have joined the partnership: UT Dallas, UT El Paso, UT Pan American, UT San Antonio, the University of North Texas Health Science Center, and the University of North Texas at Denton. Several members of the Texas Legislature and many state and federal agencies have shown strong interest in adopting the search engine for a variety of purposes.

These investments in organizational excellence contribute to enhanced resources for faculty research projects, often tracked by the money spent to conduct the scientific investigations. Research expenditures at UTA have



Source: NSF, NIH.

increased 13 percent between 2005 and 2007, while peers averaged an 11 percent increase. Research expenditures from federal sources increased 12 percent during the same time period while peers averaged a 2 percent decrease. Research expenditures from grants awarded by the National Institutes of Health (NIH) were substantially different between UTA and its peers: UT Arlington increased by 5 percent and peers reported an almost 20 percent decrease. Over the next decade, total research expenditures are expected to increase substantially, or over 200 percent, to meet the \$100 million goal outlined in the institution's strategic plan.

## Competitive Capacity

Competitive capacity, or the resources necessary to advance academic and research goals, is a fundamental building block for institutional activities. Resources include: world-class faculty, innovative buildings with advanced research laboratories and academic spaces, recognition programs to support faculty efforts, and interest from external donors.

### FACULTY RECRUITMENT

Attracting top-caliber senior researchers who are internationally recognized for advanced breakthroughs in their field leads to major innovations in discovery, development, and application of research. UTA has increased the number of tenured/tenure track faculty by 12 percent, or 69 people, since 2005. Six faculty members were recruited through the UT System STARS (Science and Technology Acquisition and Recruitment) Program and eight faculty members were retained through the same program, with a total of \$6.68 million in STARS funding.

#### STARS FACULTY



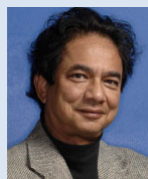
**Dr. Daniel Armstrong**, Robert A. Welch Chair in Chemistry in the department of chemistry and biochemistry, was recruited from Iowa State University. Dr. Armstrong is one of the world's most highly cited scientists, with over 450 publications and 11 patents in analytical and biological chemistry. His research has led to a new class of ultra-high stability liquids that have a profound effect on many areas of science and technology.



**Dr. Andrew Baum**, Jenkins-Garrett Professor of Psychology and Director of the Biosciences and Bioengineering Center was recruited from the University of Pittsburgh. Dr. Baum is internationally renowned for his work on chronic stress and long-term consequences of traumatic or persistent stressors.



**Dr. Paul Chippindale**, professor of biology, was retained at UTA to further his work in the study of evolutionary relationships and biological diversity using DNA sequencing.



**Dr. Purnendu Dasgupta**, Jenkins Garrett Professor and chair of the department of chemistry and biochemistry, was recruited from Texas Tech University where he held the Paul Whitfield Horn Professor endowed chair. Dr. Dasgupta uses his expertise in analytical and environmental chemistry to study issues such as air pollution and automated sensors and devices.



**Dr. Chris H. Q. Ding**, professor of computer science and engineering, was recruited from Lawrence Berkeley National Laboratory. Dr. Ding has extensive expertise in bioinformatics, machine learning, and data mining. Many of Dr. Ding's professional papers are cited extensively, providing the foundation for research in analytic research.



**Dr. Perry Fuchs**, associate professor of psychology, remained at UTA to continue his work in behavioral neuroscience. Dr. Fuchs' research strives to understand the function of the nervous system, especially to explore the ways in which the brain processes pain responses.



**Dr. Karen Johannesson**, associate professor of geochemistry in the department of earth and environmental sciences remained at UTA to study groundwater flow systems and has since taken a position as associate professor of earth and environmental sciences at Tulane University.



**Dr. Hanli Liu**, professor of bioengineering and director of the Biomedical Optics Laboratory remained at UTA to study medical instrumentation and imaging using minimally invasive and non-invasive techniques. Dr. Liu is also an adjunct of the biomedical engineering program at UT Southwestern Medical Center and an affiliate of the Institute for Cancer Research at the UNT Health Science Center at Fort Worth.

## STARS FACULTY



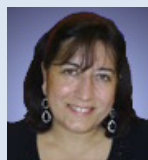
*Dr. J. Ping Liu*, associate professor of physics, remained at UTA to continue his research in hard and soft magnetic nanoparticles and nanocomposite magnets. One area of Dr. Liu's research is to chemically synthesize various hard and soft magnetic nanoparticles and apply them in drug delivery.



*Dr. Frederick MacDonnell*, professor of inorganic and bioinorganic chemistry, remained at UTA to study chemical approaches to nanotechnology, including applications for solar hydrogen production and novel cancer chemotherapies. Dr. MacDonnell's work has led to two patents.



*Dr. Robert Magnusson*, Texas Instruments Distinguished University Chair in Nanoelectronics and professor of electrical engineering, was recruited from the University of Connecticut. The recruitment package also included support from the Texas Nanotechnology Research Superiority Initiative funded by the Texas Emerging Technology Fund. An experienced entrepreneur, Dr. Magnusson's work in nanostructured photonic devices has led to many patents and two spin-out companies, one of which (Resonant Sensors, Inc.) also has received funding from the TETF to expedite commercialization.



*Dr. Fillia Makedon*, Jenkins-Garrett Professor and chair of computer science and engineering was recruited from Dartmouth College. Dr. Makedon's computational and electronic systems expertise helps develop solutions for analyzing and detecting brain patterns in multiple sclerosis and a system for secure data sharing that could be used for numerous applications.



*Dr. Efstathios Meletis*, professor and chair of materials science and engineering, remained at UTA to continue his research in surface engineering, multifunctional thin films, and small-scale materials. He has invented novel plasma treatments for surface hardening, modification and producing functionally gradient surface layers.



*Dr. Krishnan Rajeshwar*, distinguished university professor and associate dean of the college of science, remained at UTA. Dr. Rajeshwar's research expertise includes areas such as solar hydrogen production and the chemistry/materials aspects of device applications including sensors, fuel cells, and capacitors.

## INFRASTRUCTURE

New construction and renovation of state-of-the-art buildings create educational and research possibilities that drive the competitiveness initiative. Funds from the Competitiveness Initiative have been used for a physics lab upgrade (\$25,000), engineering instructional lab equipment (\$500,000) and college of science instructional lab equipment (\$500,000). UT Arlington's research space decreased 14% since 2005, losing almost 33,000 square feet. The Competitiveness Initiative will offset some of this loss by funding two new facilities that will add or renovate over 300,000 gross square feet of space: the Engineering Research Building and Engineering Laboratory Building.

### COMPETITIVENESS INITIATIVE PROVIDES \$139 MILLION FOR CAPITAL PROJECTS AT UT ARLINGTON



*The Engineering Research Building* adds approximately 230,000 gross square feet of state-of-the-art multi-disciplinary teaching and research laboratories, laboratory support spaces, and underground utilities. The \$116 million project is designed to achieve a LEED Silver Certification and benefit the computer science and engineering departments, the bioengineering department, and the science and engineering library. The project is expected to be completed in January 2011.



*The Engineering Laboratory Building* expansion consists of a new third-floor addition—approximately 27,000 gross square feet—and the renovation of two existing laboratory floors with 49,000 gsf to benefit the College of Engineering. The project will be completed in July 2009 at a cost of \$23 million.

## PHILANTHROPY TO SUPPORT STEMM INITIATIVES

A compelling indicator of competitiveness is the institution's appeal to philanthropists who join the institution's commitment to excellence. UTA raised \$2.4 million in STEMM-specific endowments since FY 2005, including graduate fellowships, distinguished chairs to support faculty research, and student scholarships. Over \$125,000 is distributed for STEMM research and scholarships on an annual basis from these new endowments. STEMM-related allocations equal 29 percent of the total philanthropic distribution per year.

*Since 2005, UTA has raised \$2.4 million in STEMM endowments that support graduate fellowships, faculty chairs, and scholarships.*

## FACULTY AWARDS

The faculty at UTA are often recognized for their significant contributions to their areas of expertise and respective fields of study. For example, six faculty members received a National Science Foundation CAREER award, a prestigious grant in support of junior faculty who effectively integrate innovative education and research:

- Dr. Seong Jin Koh, assistant professor of material science and engineering;
- Dr. Yi-Jiun Su, assistant professor of physics, now at the Air Force Research Laboratory;
- Dr. Jean Gao, assistant professor of computer science and engineering;
- Dr. Bumsoo Han, assistant professor of mechanical and aerospace engineering;
- Dr. Alan Bowling, assistant professor of mechanical and aerospace engineering; and
- Dr. Samir Iqbal, assistant professor of electrical engineering.

Dr. Efstathia Yerende, assistant professor of curriculum and instruction, received a prestigious Fulbright Fellowship for further study and lectures on teacher education and language education at the University of Kankan in Guinea. Dr. Sedrick Ervin Huckaby, adjunct assistant professor of art, was awarded a Guggenheim Fellowship for stellar achievement that allowed him to share his talents in painting quilts and capturing important family histories. These awards are some examples of the national and international recognition received by faculty at UTA.

## Incentives

Various Systemwide initiatives and institutional programs provide additional incentives to excel in science, technology, engineering, math, and medical/health.

The UT System Texas Ignition Fund (TIF) has funded projects to commercialize nine inventions at UT Arlington:

- A wireless sensor to aid in the diagnosis of gastroesophageal reflux disease;
- A surface texture for solar cells that improves its energy efficiency and cost-effectiveness;
- A liquefaction process that converts lignite to heavy crude oil in less time and with less cost than previous methods;
- Prosthetic skin to improve the sense of touch in upper limb prosthetics;
- A wireless sensor system that is 5-10 times more energy efficient than existing ones;
- A respiratory support device that improves oxygen and carbon dioxide exchange in patients awaiting lung transplantation and those suffering from chronic obstructive pulmonary disease;
- A label-free detection instrument to screen and profile large and small biomolecules;
- A clean synthetic fuel process to convert North Texas Barnett Shale natural gas to synthetic transportation fuels such as gasoline, diesel and jet fuel; and
- An optically guided needle biopsy system for improved prostate cancer diagnosis.



UT System's Chancellor's Entrepreneurship and Innovation Awards recognized Dr. Khosrow Behbehani for the development of a device for the treatment of obstructive sleep apnea, called the automatic positive airway pressure device. Dr. Behbehani is professor and chair of bioengineering and is a Fellow of the American Institute of Medical and Biological Engineering.

