boundless opportunities
THE UNIVERSITY OF TEXAS AT AUSTIN
WHAT STARTS HERE CHANGES THE WORLD

Mechanical engineering department
graduate studies
Welcome to Mechanical Engineering

A World-Class Education
The Department of Mechanical Engineering (ME) at The University of Texas at Austin (UT) is one of the premier mechanical engineering departments in the country, and the university is among the top research institutions in the world. The Times of London ranked UT Austin 15th internationally and second in the United States among all research universities. Our graduates enjoy leadership roles in engineering, business, medicine, space, government and education. The department embraces the university’s core values—learning, discovery, freedom, leadership, individual opportunity, and responsibility.

The Department and Facilities
Engineering was established as a discipline on campus in 1895, and the School of Mechanical Engineering (now a department) was founded in 1913. Today the department is home to approximately 1,000 undergrads, 300 graduate students, 60 faculty members and 37 staff members. ME is housed in a 10-story, 137,000-square-foot building on Dean Keeton Street named The Engineering Teaching Center II (ETC). ETC contains the ME administrative offices, faculty and graduate student offices, many faculty labs, a machine shop space, a computing center, classrooms, conference rooms and user facilities for microscopy. There are also several ME research labs at the UT Pickle Research Center in North Austin. Among other facilities, the Pickle campus is home to the Texas Advanced Computing Center (TACC) which maintains the largest and fastest academic computing platforms in the country. UT ME faculty and graduate students have research projects at ARL. The Microelectronics Research Center (MRC) is also on the Pickle Campus. MRC contains over 12,000 square feet of class 100 and class 1000 clean room space with many nano and micro fabrication tools. Some ME research on nanomanufacturing and nanoscience is conducted at MRC. A portion of the ME research on large scale mechanical systems is conducted at the Center for Electromechanics (CEM). Faculty, students and CEM researchers work together on large-scale energy storage and transmission problems relevant to automotive and shipboard systems. Another unique facility managed by the ME department faculty is the Nuclear Engineering Teaching Laboratory (NETL). NETL houses a 1.1 MW teaching nuclear reactor that is used for a variety of research and teaching projects.

The Future of the Profession
These are exciting times in the field of mechanical engineering. Today’s global challenges are daunting. Technical professionals solving these problems will require deep engineering science expertise and an awareness of the context and constraints of the problem space. A major goal of our graduate program is developing the next generation of technical leaders able to address these problems. We leverage the technical diversity of our faculty and the resources of The University of Texas to work towards this goal. Today’s challenges present great opportunities for the next generation of engineers to make a difference in people’s lives worldwide.

Find Out More
Please see our Web site: [http://www.me.utexas.edu](http://www.me.utexas.edu). You can also find current news and view photos on the department’s Facebook fan page.
Below: The University of Texas Tower, constructed in 1937, serves as the university’s most distinguishing landmark and symbol of academic excellence and personal opportunity. The main campus is located on 357 acres five blocks north of the Texas State Capitol grounds. Pictured below is the tree-lined South Mall and a statue of George Washington.
UT ME Research Interests and Areas of Study

Statistics and Rankings
Each year our department graduates approximately 70 masters students and 25 Ph.Ds. We receive approximately 800 applications annually from all over the world, and accept about 200 students into the ME and Operations Research graduate programs.

Research Overview
The department’s research efforts are centered around four main thrust areas — Advanced Manufacturing, Nano- and Micro-scale Engineering, Mechanical Systems Intelligence, and Clean Energy. Many of our faculty members are world-renowned researchers. Their leadership provides students an unparalleled opportunity to learn and contribute on the frontier of science and technology.

The Advanced Manufacturing Thrust area initiates, supports and coordinates research and education in advanced manufacturing, design and materials processing. International competitiveness and the continued development of the economy require a strong national effort in advanced manufacturing and materials processing. This focus include dimensions and disciplines that encompass all the important areas of mechanical engineering.

The Nano- and Micro-scale Engineering Thrust (NMSET) is a multidisciplinary group of faculty and their research groups within ME that investigates fundamental mechanical science and engineering at the micro and nano scales. Current topics of investigation include nanomanufacturing, nanomaterials, nanophotonics, nanoscale thermal/fluid transport, design for MEMS/NEMS, and nanoelectronics. Research in this area has a significant impact on energy, manufacturing, information technology, medicine and life sciences.

The Mechanical Systems Intelligence (MSI) Thrust is focused on the scientific development of intelligent machines (e.g., robots) to create a new wave of technology building on modern computing principles. The research seeks to incorporate robotics and machine intelligence into complex machine systems (e.g., aircraft, automotives, manufacturing and construction equipment, automotives and biomedical devices) to reduce human drudgery and enhance the relationship between man and machine.

The Clean Energy Thrust (CET) is extremely broad but includes the efficient conversion of nuclear, solar or liquid fuels into electricity or motive power; conversion of solar resources into next-generation biofuels (e.g., algae); end-use efficiency of devices; and systems modeling and energy infrastructure requirements. The CET group also focuses on fuel cells; rechargeable batteries; electrochemical supercapacitors; solar energy with an emphasis on the development of new materials and advanced nuclear fuel cycles; efficient manufacturing processes; system integration and control; analysis, testing and design of components at both the micro-scale and system levels; and analysis of off-design and transient behavior.
Below: Assistant Professor Carolyn Seepersad (right) and graduate student Lia Kashdan use a process originally developed at UF called selective laser sintering to design custom products and prototypes. The technique uses a high-power laser to fuse particles into a three-dimensional object. On the table are designs by Dr. Seepersad’s research group and classes for deployable airplane wings, a customized backrest and bicycle pedals, a clock and tailored honeycomb mesostructures.
Ph.D. Student Shilpa Gulati’s Antarctic Adventure

THE ENDURANCE
Mechanical Engineering Ph.D. student Shilpa Gulati (co-advised by Professors Longoria and Kuipers) embarked on a two-month adventure to Antarctica to map the topography of a perennially ice-covered lake, West Lake Bonney, in November and December of 2008. The team, headed by Dr. William (Bill) Stone, a civil engineer and University of Texas graduate, measured temperature, electrical conductivity, ambient light, chlorophyll-a, Dissolved Organic Matter, pH and redox of the water column in the lake using an underwater robot named ENDURANCE (Environmentally Non-Disturbing Under-ice Robotic ANtartiC Explorer) after polar adventurer Ernest Shackleton’s famous ship.

The robot also performed visible imaging of the benthic microbial mats, other lake-bottom materials, lake ice bottom and the glacier contact. The research was funded by NASA’s ASTEP (Astrobiology Science and Technology for Exploring Planets) program, with the objective of developing and utilizing technology that will enable exploration and discovery of life forms on other planets and satellites.

Life in Antarctica on a Research Mission
Shilpa passionately and enthusiastically described the experience as “life changing.” She said she never thought of herself as particularly adventurous or envisioned doing anything remotely like this with her life. However, she relished the entire experience—the 14-hour days running the software that she had helped write, living in tents beside the lake for a month, and working on the cutting-edge of science in challenging conditions while experiencing one of the most remote and beautiful areas on the planet. It was the kind of opportunity that is rarely realized in a lifetime.

Read more on the ME Web site: http://www.me.utexas.edu/news/2008/1108gulati_antarctica.php
Below: ME graduate student Shilpa Gulati, who specializes in artificial intelligence, worked as the software engineer for an Antarctic expedition to map the topography of an underground lake. She is standing in front of the submarine robot at a testing site. The robot went under the ice in Lake Bonney, Antarctica. The NASA funded research will enable exploration and discovery of life forms on other planets and satellites.
Current Research Initiatives

Green Algae as a Biofuel
Assistant Professor Halil Berberoglu and his research team are developing innovative technologies to provide society with sustainable and environmentally-friendly energy supplies. Dr. Berberoglu is an expert on algae systems. Algae are microorganisms that use sunlight and consume CO2, to grow and produce biofuel raw materials. Algae-based biofuels offer a more energy-efficient and economically-sustainable alternative to agricultural-based biofuels. Through innovative system design and analysis as well as fundamental biological research, Dr. Berberoglu’s team is developing efficient and economical algae-based biofuel production processes.

Longer-Lasting Energy Storage
Professor Rodney Ruoff and his research team have achieved a breakthrough in the use of a one-atom-thick structure called “graphene” as a new carbon-based material for storing electrical charge in ultracapacitor devices. This technology has the promise of improving the efficiency and performance of electric and hybrid cars, buses, trains and trams, as well as solar and wind turbine production. Everyday devices such as office copiers and cell phones benefit from the improved power delivery and long lifetimes of ultracapacitors. Electrical energy storage becomes a critical component when very large quantities of renewable electrical energy are being generated. This technology could pave the way toward shifting worldwide energy production to completely renewable energy sources, since adequate energy storage methodology is currently a limiting factor.

Biomechanics of Human Locomotion
Associate Professor Richard Neptune’s research group uses rapid prototyping techniques to optimize orthotic and prosthetic components and quickly produce prototypes to be tested in patients. His team’s research is also directed at improving sports performance by integrating models of the musculoskeletal and neuromuscular systems and design optimization techniques to improve equipment and identify optimal muscle coordination patterns. Current research involves the study of impaired muscle coordination in patients with post-stroke hemiparesis and rehabilitation methods including identifying optimal wheelchair propulsion techniques.

Dr. Neptune received a CAREER Award from the National Science Foundation for his work to design prosthetic ankle-foot components to improve the walking ability of those with lower-limb amputations.

Associate Professor Richard Neptune and his team design devices to improve the walking ability of individuals with post-stroke hemiparesis and lower-limb amputations.
Below: Assistant Professor Halil Berberoglu and his team at The Solar Energy and Biofuels Laboratory (SEBL) are studying algae as a possible source for biofuels because it offers a more energy-efficient and economically-sustainable alternative to agricultural-based biofuels.
Course and Curriculum Options

Within the Mechanical Engineering Graduate Program students choose a major of study from the specializations offered: Acoustics, Biomechanical Engineering, Dynamic Systems and Control, Manufacturing and Design, Materials Engineering, Nuclear and Radiation Engineering, and Thermal/Fluids Systems. There is flexibility in the graduate course schedule. A mix of courses taken from the area, department, college, and university can be assembled to fulfill the degree requirements. The department offers joint degree programs with the LBJ School of Public Affairs (MSE/MPA) and the McCombs Graduate School of Business (MSE/MBA). Admission into the joint programs requires independent admission both to ME and the associated graduate program.

How to Apply
Applying to the Mechanical Engineering/Operations Research and Industrial Engineering Graduate Program is a two-step process requiring the online submission of the ApplyTexas Application and the department’s Supplemental Application followed by other required documentation. For detailed instructions, please see http://www.me.utexas.edu/graduate/applying.php in the graduate portion of our Web site.

Funding
Every admitted student is considered for financial support through fellowships and/or through RA/TA (Research Assistant/Teaching Assistant) positions. However, admission to our graduate program does not guarantee an offer of financial support. You will be contacted if you are selected to receive funding. Over 85% of our graduate students are funded through fellowships or assistantships.

While funding for international students is readily available, most typically through RA/TA positions, U.S. citizens are eligible to receive more wide-ranging support from substantially greater resource pools.

Academic Profiles of Typical Admitted Students
The average GRE scores for recently-admitted students are 550 (V), 770/780 (Q), and 4.5 (AW). The average GPA of recently-admitted students is 3.62/4.0 in upper-division undergraduate courses or graduate courses.

Non-native English speakers must score at least 550 (paper-based), 213 (computer-based) or 79 (iBT) on the TOEFL. TOEFL scores are good for two years. Unless you graduated from a U.S. high school or college/university for your undergraduate degree, you must take the TOEFL. Even if you are currently at a U.S. institution working on your M.S., you must have unexpired TOEFL scores. IELTS can be used instead of the TOEFL, but you must notify the ME Department of this when you begin the application process.

Austin
While we have focused on the excellence in educational opportunities found at UT ME, it is worth noting what the Austin area provides. Austin, one of the country’s most desirable cities, is the jewel of Texas with its mild winters, dry weather, hill country beauty, exciting metro area, expansive park system, diverse music and entertainment scenes, and many stunning lakes and rivers. In terms of quality of education and quality of life, The University of Texas at Austin is an exceptional graduate school experience. If you have any questions, please contact our graduate office, and we’ll be happy to assist you.

E-mail: go@me.utexas.edu
Phone: (512) 232-2702
Web site: http://www.me.utexas.edu
Below: Pedernales Falls State Park is a 5,211-acre state park about 40 miles west from campus in the Texas Hill Country. It is a favorite destination for hiking, swimming, biking, bird watching, camping and horseback riding. See the Texas Parks and Wildlife Web site (http://www.tpwd.state.tx.us/), the LCRA Web site (http://www.lcra.org/), and the City of Austin Web site (http://www.ci.austin.tx.us/parks/) for detailed information on outdoor recreation activities around Austin.
About the Photos:

Cover: Astronaut Dr. Karen Nyberg pictured aboard the Space Shuttle Discovery, received her Ph.D. from UT ME in 1996. Photo courtesy of NASA.

Above: "Clock Knot," a sculpture by Mark di Suvero, was recently installed outside the ETC building.