More than 40 Engineering Student Organizations to Get Plugged Into: Make Your Mark at Texas Tech!

Study Abroad in Chile, Germany, and Many More

Alumnus Serves as Captain of Navy Aircraft Carrier

ASME Students Win Second in International Contest

Students Win Sandia National Laboratories MEMS Contest

Dean Al Sacco Jr.: From Space to Lubbock, Texas
Fluor International Engineering Program Sends Students Abroad

There is a growing demand for engineering graduates with international experience. Employers are seeking applicants with an awareness of global business practices, cross-cultural communications skills, and language fluency.

The Fluor International Engineering Program provides students with quality international engineering experiences that prepare them to work in a global environment.

In the recent years, more than 100 engineering students chose to study abroad. The program’s goal is to have 50% of the college’s students complete a study abroad experience before graduation.

One opportunity for engineering students is faculty-led experiences. Texas Tech faculty members lead study abroad programs in their area of expertise in environments outside the U.S. These engineering programs allow students to enroll in Texas Tech courses with Texas Tech professors, but on foreign soil. In recent years, students have had the opportunity to enhance their academic experience by studying in the following locations:

- **Santiago/Vina Del Mar, Chile**
  Hosted by: International Studies Abroad

- **Nantes, France**
  Hosted by: l’École Centrale de Nantes

- **Wilhelmshaven, Germany**
  Hosted by: Jade Hochschule Wilhelmshaven

- **Seville, Spain**
  Hosted by: Texas Tech Center in Seville

- **Hønefoss, Norway**
  Hosted by: Buskerud University College

- **Luleå, Sweden**
  Hosted by: Luleå University of Technology

Students in the college also have the opportunity to participate in semester-long exchange programs and service abroad opportunities through student organizations, such as Engineers Without Borders.
Student Organizations Offer Service, Academic Support, and Relationships

Joining a student organization is the greatest way to get involved on campus and in the college. There are approximately 40 organizations within the Whitacre College of Engineering and more than 450 organizations currently registered at Texas Tech University, with more than 20,000 members participating in these groups.

Engineering student organizations include professional societies, honor societies, competition groups, and other organizations. These organizations provide valuable social support for students outside of the classrooms allowing them to build contacts and friendships across the college.

Students develop leadership, communication, and networking skills through involvement in on-campus organization activities and by attending regional conferences. Membership in professional societies helps students learn more about the professional opportunities in their chosen engineering discipline. Life-long membership in these societies is encouraged by the engineering profession. Many student organizations host career sessions that allow company representatives to present information about their company and provide opportunities for students to meet recruiters.

A list of student organizations is available below and on the college website at www.coe.ttu.edu with contact names and other information.

Engineering Student Organizations and Honors Societies

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<th>Organization</th>
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<td>American Association of Drilling Engineers</td>
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<td>ACM</td>
<td>Association for Computing Machinery</td>
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<td>AGC</td>
<td>Associated General Contractors of America</td>
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<td>ACHE</td>
<td>American Institute of Chemical Engineers</td>
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<td>AGEE</td>
<td>Professional Sorority for Women in Engineering and Technical Sciences</td>
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<td>AHI</td>
<td>American Society of Heating, Air Conditioning and Refrigeration Engineers</td>
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<td>ASCE</td>
<td>American Society of Civil Engineers</td>
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<tr>
<td>ASHRAE</td>
<td>American Society of Heating, Refrigeration and Air Conditioning Engineers</td>
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<td>ASME</td>
<td>American Society of Mechanical Engineers</td>
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<td>AWEE</td>
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<td>EW</td>
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<td>SAE</td>
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<td>HFES</td>
<td>Human Factors and Ergonomics Society</td>
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<tr>
<td>IAESTE</td>
<td>The International Association for the Exchange of Students for Technical Experience</td>
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<td>IEEE</td>
<td>Institute of Electrical and Electronics Engineers</td>
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<td>IE</td>
<td>Institute of Industrial Engineers</td>
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<td>NSBE</td>
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<td>Society of Transportation Engineers</td>
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<td>Society of Manufacturing Engineers</td>
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<td>SPE</td>
<td>Society of Petroleum Engineers</td>
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<td>SPEED</td>
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<td>SRT</td>
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<td>Society of Women Engineers</td>
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<td>TAE</td>
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<td>Team 1817</td>
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<td>USGBC</td>
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<td>WME</td>
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Students Win Sandia National Laboratories MEMS Contest

For a third straight year, Texas Tech University engineering students emerged victorious in this year’s design contest for novel microelectromechanical systems (MEMS), held at Sandia National Laboratories. Teams from Texas Tech have been winners in the competition in six of the last eight years.

The winning entry is a microscale rheometer that is 1.2 millimeters by 2 millimeters, and able to measure the behavior of thin quantities of liquid, like the synovial fluid in knee joints. This method requires a much smaller sample compared to the standard tool.

The contest is open to institutional members of the Sandia-led MEMS University Alliance program, part of Sandia’s outreach to universities to improve engineering education. It provides an arena for the nation’s student engineers to hone their skills in designing and using microdevices. Such devices are used to probe biological cells, arrange and operate components of telecommunications and high-tech machinery and operate many home devices and strengthen national security.

ASME Students Win Second Place in International Old Guard Contest

Texas Tech won second place in the Old Guard Oral Presentation Contest at the ASME 2012 International Mechanical Engineering Congress & Exposition. The contest included representatives from England, France, India, Lebanon, Mexico, the United States, and other countries.

The project was “Reinventing the Wheel: A Radially Collapsing Wheel for an Innovative Wheelchair Design.” The design for the radially collapsing wheel targets the demand by users for a size-conscious wheel that does not need to be removed from a wheelchair for transportation. This design meets all structural strength requirements and adds the revolutionary benefit of collapsibility.

The wheel design uses a scissor geometry supported by 16 structural spokes. Each spoke is connected to one of two central hubs, with adjacent spokes alternating between hubs. When fully extended, the hubs separate to provide further stability and support for the wheel. Rubber tread completes the smooth radius. Additionally, the tread provides shock absorption and vibration reduction, which will greatly increase the user’s comfort. To collapse, the hubs easily slide into plane and allow the scissor geometry to fold about the central axis.

After collapsing, the assembly slides neatly into the cylindrical housing located under the seat of the wheelchair. This collapsed wheel provides a compact and streamlined package that gives this wheelchair an advantage over all other foldable chairs.

The team previously won first place in the Old Guard Oral Presentations at the regional District E competition of ASME’s Student Professional Development Conference. The winning student presenter was Pejmon Arbrapour.
Engineering + Honors = Benefits for You

As an engineering student, you have three ways to combine your engineering degree with Honors:

- Earn a bachelor’s degree with Honors or Highest Honors.
- Earn a bachelor’s degree with Honors or Highest Honors and a master’s degree in only five years through the Honors College Access Program.
- Take smaller, more dynamic Honors sections of courses required for your degree program.

You are eligible for perks that include the opportunity to live in Murray or Gordon Halls, the Honors residence halls and learning community; first-day registration for classes; early admission programs with the Texas Tech School of Medicine and Texas Tech School of Law; and many more:

- Waiver of GRE for Honors students
- Honors College Access Program
- Cross-listed classes (5000/4000) for seniors
- Faculty mentors for URF and Honors thesis
- Study Abroad Funding

You are encouraged to participate in study abroad as part of your undergraduate education. The Honors College offers Study Abroad Scholarships to help offset the costs of travel and living expenses. In addition, you can obtain Honors credit through reading and writing assignments.

Transferring to Texas Tech is Easier than Ever

Transfer students represent a key component of the college’s student population. Transfer students in the college have the opportunity to participate in 2+2 Degree Programs, a uniquely designed pathway that allows students to complete two years of study at a community college, transfer to Texas Tech, and finish an engineering degree in two years.

The 2+2 Degree Programs are currently available at Alamo Colleges, Amarillo College, Angelo State University, Austin Community College, Lone Star Colleges, McLennan College, Midland College, Odessa College, Richland College, South Plains College, and Tarrant County College.

Students in the 2+2 Degree Programs have the opportunity to major in chemical engineering, civil engineering, computer engineering, computer science, construction engineering, electrical engineering, engineering physics, engineering technology, industrial engineering, mechanical engineering, and petroleum engineering.

The college offers competitive, merit-based, and need-based scholarships specifically for transfer students, and some scholarships are available for students transferring from specific colleges.

For more information on transferring to the Whitacre College of Engineering, contact your community college advisor or the Associate Dean for Undergraduate studies at 1.800.528.5583.
Dean Profile

When he arrived at Texas Tech, there were two things that Al Sacco Jr. said impressed him greatly: the overwhelming support and generosity of the alumni, and the university’s forward thinking.

The challenge begins, he said, in transforming Texas Tech into a community of scholars, not just a group of individuals, and delivering inspiration to generations to come.

“Our world is technology driven, but fewer students are becoming involved in math and science,” Sacco said. “China and India are quickly catching up – and in some cases surpassing us – and developing technologies that can impact our economic future as well as our freedoms.”

A chemical engineer by trade, it was his research with zeolite crystal growth (ZCG) that landed Sacco a seat on the Space Shuttle Columbia in 1995. A zeolite crystal’s three-dimensional structure acts as a sieve to selectively filter certain chemicals (molecules) in applications such as chemical and petroleum processing. A larger crystal would allow researchers to better understand how these crystals form and grow and define its structure, while improving storage and efficiency. The challenge, however, was growing that larger crystal.

“The Earth’s gravity plays a role in the crystal’s formation and growth. Like the formation of snow flakes here on earth, where the unique shapes are controlled by environmental conditions and the snow flake’s falling rate. In a similar manner, gravity can impact the structure and shape of many crystals,” Sacco said. “However, ZCG in a microgravity environment allows the crystal to grow larger, with less distortion.”

Sacco envisions a world that can essentially sustain itself and cited an example of street lights powered not by electricity, but by nutrients hidden in the soil beneath it.

Sacco’s work in the pressurized Spacelab module of Columbia proved successful, with crystals growing up to 50 times larger than ever before. That technology now is being applied to continuing ZCG research on Earth. The result may improve the efficiency of many electronics, including the handheld devices so many have come to rely on.

“Tier One means working together and striving for what comes next,” Sacco said. “My goal is to build a better line of communication between all Texas Tech colleges, not just engineering, and with Texas Tech University Health Sciences Center, as well.”

“My goal is to make Texas Tech University the top research facility in Texas and beyond” he said.

Alumni Profile

Engineering Alumnus Serves as Commander of USS Abraham Lincoln

A Texas Tech alumnus recently completed his duties as the commanding officer of a U.S. Navy aircraft carrier that is roughly half the size of his hometown.

The 1,092 foot-long ship, commissioned Nov. 11, 1989, displaces 97,500 tons of water and uses the propulsion of two nuclear power plants to move it around the ocean. The crew of nearly 5,500 consumes more than 20,000 meals daily. These meals consist of 600-800 loaves of bread, 13,000 sodas and 620 pounds of hamburger daily.

Rear Adm. (select) John D. Alexander graduated in 1982 with a Bachelor of Science in mechanical engineering.

Alexander's mechanical engineering degree and time at Texas Tech were crucial to his Navy career. He initially used his degree during his aviation indoctrination courses when he studied engines and flight dynamics. Also, it was useful during his flight training to understand operating and weapons systems on the aircraft, and during nuclear propulsion training.

During his time at Texas Tech, Alexander was involved with many student organizations. He was the Student Association Vice President for External Affairs his senior year. He also doubled as the editor-in-chief of “The Word” magazine and wrote the cover article on the space shuttle Columbia for the 1981 fall semester publication. In addition, he was a member of Sigma Chi fraternity, a member of Pi Tau Sigma, the international mechanical engineering honor society, and also was an Alpha Delta Pi Little Brother.

Alexander applied to the Navy's aviation program during his second year at Texas Tech, and was accepted into the Aviation Reserve Officer Candidate program while still in college. He attended the Aviation Officer Candidate School in Pensacola, Fla., following graduation.

Before taking command of the USS Abraham Lincoln, Alexander served as executive officer of USS Dwight D. Eisenhower and as head of aviation commander assignments at Navy Personnel Command. He was named Naval Flight Officer of the Year in 1994. Alexander has accumulated more than 3,200 flight hours with 707 carrier-arrested landings.

He was named a “Distinguished Engineer,” by the Whitacre College of Engineering in April 2012 and a “Distinguished Alumni” at Texas Tech University in January 2013.

He is now serving as an assistant commander for the Navy Personnel Command for Career Management.

Before taking command of the USS Abraham Lincoln, Alexander served as executive officer of USS Dwight D. Eisenhower. He earned a Bachelor of Science in Mechanical Engineering from Texas Tech.
Engineering Job Fair Welcomes Companies, Employers, and Students

The Engineering Job Fair features more than 140 companies looking to fill internships, co-ops, full-time positions, and other positions. More than 2000 Texas Tech students ride the free shuttles or make their way to the Lubbock Memorial Civic Center each semester to take advantage of the career opportunities.

The one-day employment exposition has evolved from humble beginnings in 1999, with only 22 companies meeting outside in the campus Engineering Key.

The Whitacre College of Engineering Job Fair is the perfect chance to meet companies looking for Texas Tech engineers. Whether you are a graduating senior looking for a full-time position, a sophomore or junior looking for an internship or co-op or a freshman just curious about the future, come to the Engineering Job Fair, meet the companies and find out what careers in engineering are all about.

The Engineering Job Fair is held in the fall and spring semester each year. All engineering students are encouraged to attend.

For more information, visit: www.coe.ttu.edu/careers.

Engineering Ranks Among Top 25 Schools for Skilled and Educated Graduates

The Whitacre College of Engineering is one of the Wall Street Journal’s (WSJ) “Top 25 schools that produce the best graduates,” according to recruiters for the nation’s largest public and private companies, nonprofit organizations, and federal agencies.

The WSJ wanted to identify the schools that are most likely to help students land a job in key careers and professional areas that are growing, pay well, and offer high levels of satisfaction.

From the state of Texas, Texas Tech along with Texas A&M University were the only two schools to be ranked in the top 25. Texas Tech placed ahead of schools such as Harvard, Yale, UT Austin, University of Southern California, and Princeton.

To be considered for the engineering ranking, a school had to have at least seven companies rank it; most had more. The result is a list of the Top 25 schools that produce the best graduates, according to recruiters, and similar rankings broken down by recruiter favorites in eight majors or combination of similar majors.
At the American Institute of Chemical Engineers (AIChE) National ChemE Car Competition at the AIChE Annual Meeting in Minneapolis, Minn., the Texas Tech University ChemE Car Team was awarded the “Safety Award.”

The goal of the competition is to provide chemical engineering students with the opportunity to participate in a team-oriented hands-on design and construction of a small chemical-powered model car. This vehicle must be designed to also carry a specified cargo. The winner is determined by a combined score based on several factors, for traveling the correct distance, and for creativity.

Teams compete at the regional conferences and the winners of each regional conference compete at the national conference.
Whitacre College of Engineering Facts and Highlights

The Texas Tech University Whitacre College of Engineering offers quality undergraduate programs that stress the fundamentals of engineering and its practice. Graduates are ready for an engineering career, advanced studies, or other professional paths.

Graduate programs provide strong research experiences, as well as preparation for a professional, academic, or research career.

Texas Tech faculty and students pursue basic and applied research that generate new knowledge and create technical solutions to society’s challenges, all in an environment that is committed to the individual student’s success.

AREAS OF EXCELLENCE

Nano Tech Center and Nanophotonics Center
The primary emphasis of the Nano Tech Center and the Nanophotonics Center is the study of the behavior of light at the nanometer scale. These centers study the generation and manipulation of light using ultrasmall, engineered structures. This tiny technology has the potential to revolutionize telecommunications, the computer industry, as well as residential and commercial lighting.

Pulsed Power and Power Electronics
Pulsed Power has the potential to be revolutionary technology for armed forces by equipping them with devices to trigger or neutralize improvised explosive devices before their convoy approaches, thus saving lives. This high voltage system also could provide efficient military ship power for destroyers at sea.

Water Resources Center
The WRC’s research activities focus on current water issues of regional importance to the Texas High Plains as well as international water issues. Focusing on water augmentation, conservation, and protection, the group investigates perchlorate occurrence, wastewater issues, and municipal water conservation.

Multidisciplinary Research in Transportation (TechMRT)
TechMRT conducts laboratory and field research for various transportation funding organizations and programs. The research portfolio includes pavement and bridge engineering, geotechnical systems, roadway planning, environmental issues, hydraulics, construction, and vehicle engineering.

WHITACRE COLLEGE OF ENGINEERING FACTS

Dean: Al Sacco Jr., Ph.D.
Founded: 1925
Enrollments:
- PreEngineering: 610
- Undergraduate: 4,111
- Graduate: 745
Endowed Chairs, Professors, and Fellows: 23
Externally-funded Research: $16.1 million

ACADEMIC AREAS OF STUDY

- Bioengineering
- Chemical Engineering
- Civil Engineering
- Computer Engineering
- Computer Science
- Construction Engineering
- Construction Engineering and Management
- Electrical Engineering
- Environmental Engineering
- Industrial Engineering
- Mechanical Engineering
- Nuclear Engineering
- Petroleum Engineering
- Software Engineering
- Systems and Engineering Management
- Wind Science and Engineering

DEGREE PROGRAMS

- 11 Bachelor’s Degrees
- 2 Graduate Certificates
- 12 Master’s Degrees
- 9 Doctoral Degrees

POINTS OF PRIDE

- Among the largest colleges of engineering in the U.S.
- One of the Wall Street Journal’s “Top 25 schools that produce the best graduates.”
- Recipient of $15 million gift from petroleum engineering alumnus Bob L. Herd.
- Texas Tech is home to the only Ph.D. degree program in Wind Science and Engineering.
- One of only 16 accredited petroleum engineering programs in the U.S.
Whitacre College of Engineering Departments Overview

CHEMICAL ENGINEERING
From pharmaceuticals that can improve lives to green chemistry that may help remove hazardous substances, chemical engineers transform the knowledge of chemistry into powerful materials for the betterment of society.

Our faculty are experts in polymers and materials, nanotechnology, energetic nano-materials, biotechnology and biomedical engineering, bio-molecular modeling and alternative new generation biofuels.

CIVIL AND ENVIRONMENTAL ENGINEERING
From designing modern skyscrapers to ensuring clean drinking water, civil and environmental engineers affect quality of life and public safety.

These faculty have expertise in design of buildings, shelters and bridges; windstorm damage mitigation; renewable wind energy systems; wastewater treatment, hazardous waste treatment, flooding, and water resources management.

COMPUTER SCIENCE
Computer science professionals study the theoretical foundations of information representation and computation.

Faculty in this department teach and do research in areas involving programming languages, distributed computing and parallel processing, artificial intelligence techniques, intelligent systems, robotics, software engineering, and distributed databases.

CONSTRUCTION ENGINEERING AND ENGINEERING TECHNOLOGY
Engineering technologists apply engineering principles and knowledge to develop practical solutions to complex problems.

The faculty at Texas Tech have a wide range of interest and expertise including geotextiles, wind and soil erosion modeling, rapid bridge replacement, prestressed concrete, construction management, digital remote control and telemetry systems, power generation, manufacturing processes, video imaging and analysis, sustainable construction, HVAC system design, and energy usage.

ELECTRICAL AND COMPUTER ENGINEERING
Electrical and computer engineers work with electronics, telecommunications and integrated circuits – from generating electrical power for the national grid, to novel integrated circuits for wireless communications, to designing the smallest computer chip in your cell phone – the creativity of electrical and computer engineers provide solutions that better our lives.

Our faculty members are experts in pulsed power systems, optoelectronics, computer vision and image processing, energy and power systems, medical microelectronics, embedded systems, wireless communications, and sustainable energy systems.

INDUSTRIAL ENGINEERING
From improving patient flow at a hospital to consulting with Fortune 500 companies on management strategies, manufacturing, ergonomics, and logistics, industrial engineers design and operate systems, providing high-quality products and services in safe and cost-effective ways.

Our faculty members are experts in biomechanics, safety, nanomaterials, environmentally conscious manufacturing, management of technology and complex organizations, and operations research.

MECHANICAL ENGINEERING
Mechanical engineers design, manufacture, and test mechanical devices from submarines to tiny nanobot devices and artificial organs.

The faculty in mechanical engineering are experts in energetics, biomechanics, superhard materials, nanomechanics, computational and environmental fluid mechanics, fuel cells and alternative fuels in automotive design, and MEMs.

BOB L. HERD DEPARTMENT OF PETROLEUM ENGINEERING
Petroleum engineers literally fuel the world – finding and producing safe, clean and affordable oil and gas supplies – all while safeguarding the environment.

Blending theory with practical knowledge, petroleum engineering faculty are experts in core analysis; pressure, volume, temperature (PVT) analysis; natural gas engineering; artificial lift and system analysis; and surface operations and facilities design.
Find Your Place in Engineering at Texas Tech: 8 Departments and 12 Undergraduate Majors!

Students wear color-coded shirts that match their majors at the Engineering Kick-Off Event, a time to bring students, faculty, staff and industry partners together for fun.

Whitacre College of Engineering
Undergraduate Overview

Bob L. Herd Department of Petroleum Engineering
Bachelor of Science in Petroleum Engineering

Department of Chemical Engineering
Bachelor of Science in Chemical Engineering

Department of Civil & Environmental Engineering
Bachelor of Science in Civil Engineering
Bachelor of Science in Environmental Engineering

Department of Computer Science
Bachelor of Science in Computer Science

Department of Mechanical Engineering
Bachelor of Science in Mechanical Engineering

Department of Industrial Engineering
Bachelor of Science in Industrial Engineering

Department of Electrical & Computer Engineering
Bachelor of Science in Computer Engineering
Bachelor of Science in Electrical Engineering

Department of Construction Engineering & Engineering Technology
Bachelor of Science in Construction Engineering