

Undergraduate Education Program Guide



THE UNIVERSITY OF
TENNESSEE
KNOXVILLE

COLLEGE OF ENGINEERING



A Message from the Dean

To our prospective students: Welcome to the world of engineering at the University of Tennessee at Knoxville.

Many of you may wonder, “What exactly is engineering?” Engineering involves solving problems using science and math. Engineers are creators, designers, innovators and problem-solvers and help to provide a more technologically advanced, cleaner, and safer world.

Engineers play a role in the production and development of almost everything we use in our daily lives—from iPod-like music and video players to the chips that power our computers; from the microfibers that make up the fabric of a new jacket, to the materials used in space and air craft; from biomedical devices to miniature robots used in national security.

Engineers helped man land on the moon and assist in the explorations of our oceans. Engineers

design and build bridges and roads and set up the transportation systems that make them work. They also develop new alternative fuels and vehicles and means of harnessing energy such as wind turbines and photovoltaic solar cells.

Engineering is not just about facts and numbers. Engineering is about using your intelligence, education, training, and creativity to improve the quality of life for the people on our planet.

The University of Tennessee College of Engineering offers you an opportunity for a superior education in the engineering field. For over 175 years, our college has provided the advanced engineering skills and training that place our graduates on the forefront of contemporary technological developments.

We appreciate your interest, and hope you will visit our campus in the near future.

Best regards,

Wayne T. Davis
Dean of Engineering



Getting Started

If you are interested in becoming an engineer, you should understand that the profession includes a wide range of areas, from aerospace to nuclear engineering. In many cases, freshmen entering the engineering program at UT don't always know exactly what type of engineer they want to be and that's fine. You should, however, educate yourself on the different fields of study so you can be prepared when the time comes to declare a major.

The American Society for Engineering Education's website is a good place to start:

www.egfi-k12.org/

This page contains links to additional engineering sites that will provide you with more information about the profession.

Prospects for Success

Professional engineers are in great demand, both in the U.S. and internationally. Career opportunities for graduating students with B.S. degrees are excellent, and salaries for entry-level positions are very good.

If you would like more specific engineering career information, visit the UT Career Services web site: www.career.utk.edu

Well-known and respected corporations regard UT as a target university for hiring new engineers. Many of our graduates have risen to top positions in industry, government, and academia. An engineering degree from UT offers an excellent foundation for a successful career.



UT alumnus Jim K. Flood (right), Vice President Arctic/
Eastern Canada, ExxonMobil, with Jim Taylor (left),
ExxonMobil's Production Manager in Russia.

Featured Alumnus

Jim Flood

1980 BS Civil Engineering Graduate
Vice President Arctic Project
Development, ExxonMobil

"I have been working with ExxonMobil since I graduated from the UT College of Engineering, and as I look back at on the thirty-four years since graduation, I truly believe that the balance in both technical and people skills that I received from the civil engineering curriculum provided me with the foundation for my success. My current position as Vice President for Arctic Project Development for ExxonMobil has given me opportunities to work on world-class arctic projects such as the ones shown in these two pictures of the Offshore Arkutun-Dagi Platform offshore of the Sakhalin Island in Russia. The Arkutun-Dagi Platform, weighed in at forty-two thousand tons and was floated over and installed on the large gravity-based concrete structure in June of 2014. This was an industry record weight and is currently the largest offshore structure in Russia.

I truly believe that the engineering and leadership skills that I developed while at the university provided me with the ability to be able to do "critical thinking," solve complex problems, and to participate in teams that value diversity and inclusion. This combination of skills that students receive from UT helps differentiate us from other university graduates as assets "ready to go to work" and helped to jump start my career with ExxonMobil. I fondly (now) look back at my concrete/ structural engineering classes led by Professor Ed Burdette, because he taught us to understand the science and engineering principles first and told us that the grades will take care of themselves. This understanding has stayed with me for over thirty years and has helped me work with my teams to develop sound engineering solutions. I have a message for all prospective and current engineering students: make sure you are taking the time to really learn and understand these key engineering principles and they will stay with you for your entire career."



Admission Requirements

The College of Engineering has established admissions criteria for incoming freshmen on several performance criteria, including completion of core academic subjects, GPA scores on these subjects, and standardized test (SAT or ACT) scores. A Success Prediction Indicator (SPI) number of 60 and a math ACT of 25 or a math SAT of 570 are minimum standards used for admission to the College of Engineering. The admitted class may also be limited by space available in the College. The SPI is calculated by adding an individual's ACT mathematics score to ten times their core high school GPA (based on a 4.0 scale). For information on what constitutes core high school courses, please consult the admission website: www.admissions.utk.edu/undergraduate/apply/requirements.shtml.

SPI EXAMPLE: A student with a high school core GPA of 3.5 and an ACT mathematics score of 28 would have an SPI of 63 using the formula $(3.5 \times 10) + 28 = 63$. SAT scores are converted to an equivalent ACT score to perform this calculation.

Students who wish to pursue a degree in the College of Engineering at the University of Tennessee, Knoxville, but do not meet the college admission criterion may enroll as University Exploratory students and complete appropriate mathematics, science, and other courses before applying again for admission to the College of Engineering.

You can apply online at the University of Tennessee website: www.admissions.utk.edu

Visit Us:

Admissions Office for total campus tours: www.admissions.utk.edu/visit/here/CVP

Engineering specific tours: www.engr.utk.edu/ambassador/tours.php

Transfer students

Transfer students, including internal University of Tennessee, Knoxville, transfers, must meet the minimum requirements stated below to be considered for admission to a major within the college. These minimum standards for consideration do not guarantee being admitted

to the major. The final admission decision for the major resides with the department head or designee.

Students must have earned a minimum 2.8 cumulative average and a C or better in each of these specific courses, or their equivalent: [ENGL 101](#) *, [CHEM 120](#) * (for Computer Science students: [COSC 102](#) * and [COSC 140](#) or equivalents), and [MATH 141](#) * (and subsequent courses in the three sequences, if taken).

If the student has completed any physics course, he/she must have earned a grade of C or better.

The overall record will be evaluated for quality and seriousness of purpose. An excessive number of withdrawals, incompletes, repeated courses, or failures may result in denial.

Any University of Tennessee, Knoxville, student who wants to associate with one of the departments in the College of Engineering should go to the Engineering Advising Office. An advising session is held with the major items of consideration being the same as for external transfer students. For more information on advising, visit www.engr.utk.edu/advising

If external transfer students are denied admission to the College of Engineering, the student must contact Undergraduate Admissions to declare a new major for admission to UT.

Scholarships and Financial Aid

Generally, three types of financial aid are available: scholarships, loans, and part-time employment. These can be offered individually or in combination according to the needs of the family and the student.

For specific questions regarding engineering scholarships, contact the College of Engineering Office of Academic and Student Affairs at (865) 974-2454 or engr.utk.edu.

For more details and information, visit the One Stop Shop website: onestop.utk.edu/your-money

Contact the Financial Aid office at (865) 974-3131.

You will also find information about tuition costs and other fees on the One Stop Shop website: onestop.utk.edu/your-money/tuition-fees/

Austin Fullbright

Electrical Engineering Major,
Co-op Participant
Engineering Ambassador

“Two things fueled my passion for engineering during high school. First were the influential math and science teachers that both challenged and prepared me for success in the undergraduate classroom. Second was attending the Tennessee Governor’s School of Computational Physics the summer between my high school junior and senior year. From then on, I knew that electrical engineering was for me as I saw in my fellow classmates and instructors a contagious desire to learn and be engaged in significant work. I wanted to find a community like that when I made my college decision.

After touring the Southeast’s best engineering colleges, I found that and more at the University of Tennessee (UT). I experienced a unique freshman program that fosters community and engages students in interesting and meaningful coursework from the start. In fact, our freshman program is nationally acclaimed for its excellent faculty and has one of the top retention rates of freshman engineering students in the country. Being a part of a diverse campus was also important in my decision to attend UT, a characteristic that gives us a considerable advantage on many engineering schools. I’ve never felt like being an engineering student has hindered my college experience, because there is so much offered outside of the classroom as well. Whether it’s opportunities for research, engineering work experience, intramurals, or service organizations, UT has something for everyone. The Office for Cooperative Education is also top notch when compared to similar programs offered by our peer universities, and I have seen firsthand the interest our faculty has in seeing their students succeed in the workplace through internship and multi-term work opportunities. Having completed an internship and a three-term co-op, I found the work experience an invaluable addition to my education while also making a competitive salary. Further, one of my favorite aspects of UT and the College of Engineering is the



opportunity to be invested in by faculty through organizational leadership. I have found my niche as an ambassador for the engineering college and the Engineering Professional Practice Office. Outside of my academic studies, I serve as a Student Alumni Associate and play on more than fifteen intramural sports teams each year. Looking back on my college experience, I can honestly say that the UT College of Engineering has been a perfect fit for me.

I have enjoyed the challenges and growth that accompanies the college experience, and look forward to opportunities and changes that take place as I finish my journey here. I plan to continue to seek out opportunities to invest in my education, my peers, and this college, putting myself in the best position I can to succeed following graduation. I’m excited for the future of the UT College of Engineering as we continue to bring in the best and brightest students from around the world and take steps to improve an already outstanding educational atmosphere.”



The Jerry E. Stoneking
engageTM
ENGINEERING FUNDAMENTALS PROGRAM



Freshman Engineering



The University of Tennessee is home to one of the nation's most innovative freshman engineering programs – the Jerry E. Stoneking

Engage Engineering Fundamentals Program – a leading edge, success-oriented approach to first-year engineering education. Almost all freshman students admitted to the College of Engineering are automatically enrolled in the Engage program.

The Engage curriculum is built around teaming students for project-oriented, hands-on activities. Topics covered during the Engage program include physics, computer skills, engineering design, and problem solving.

Students are introduced to realistic, mind-engaging problems in the engineering design process, allowing them to experience the same decision-making process as practicing engineers.

The Engage program is housed in historic Estabrook Hall. The building includes classrooms with large open spaces for hands-on activities, a student project area, a computer classroom, and an open computer lab. A freshman village atmosphere is encouraged, with faculty and graduate assistant offices, study areas, and project labs located in Estabrook.

The Engage program provides the support to assist engineering students in their studies and projects during the crucial freshman year.
www.engr.utk.edu/efd/

Engage and RISER Living Communities

The College of Engineering offers optional housing programs for freshmen known as the Engage and RISER Living Communities where first-year engineering students can live together. About 30% of incoming students choose to live in these communities.

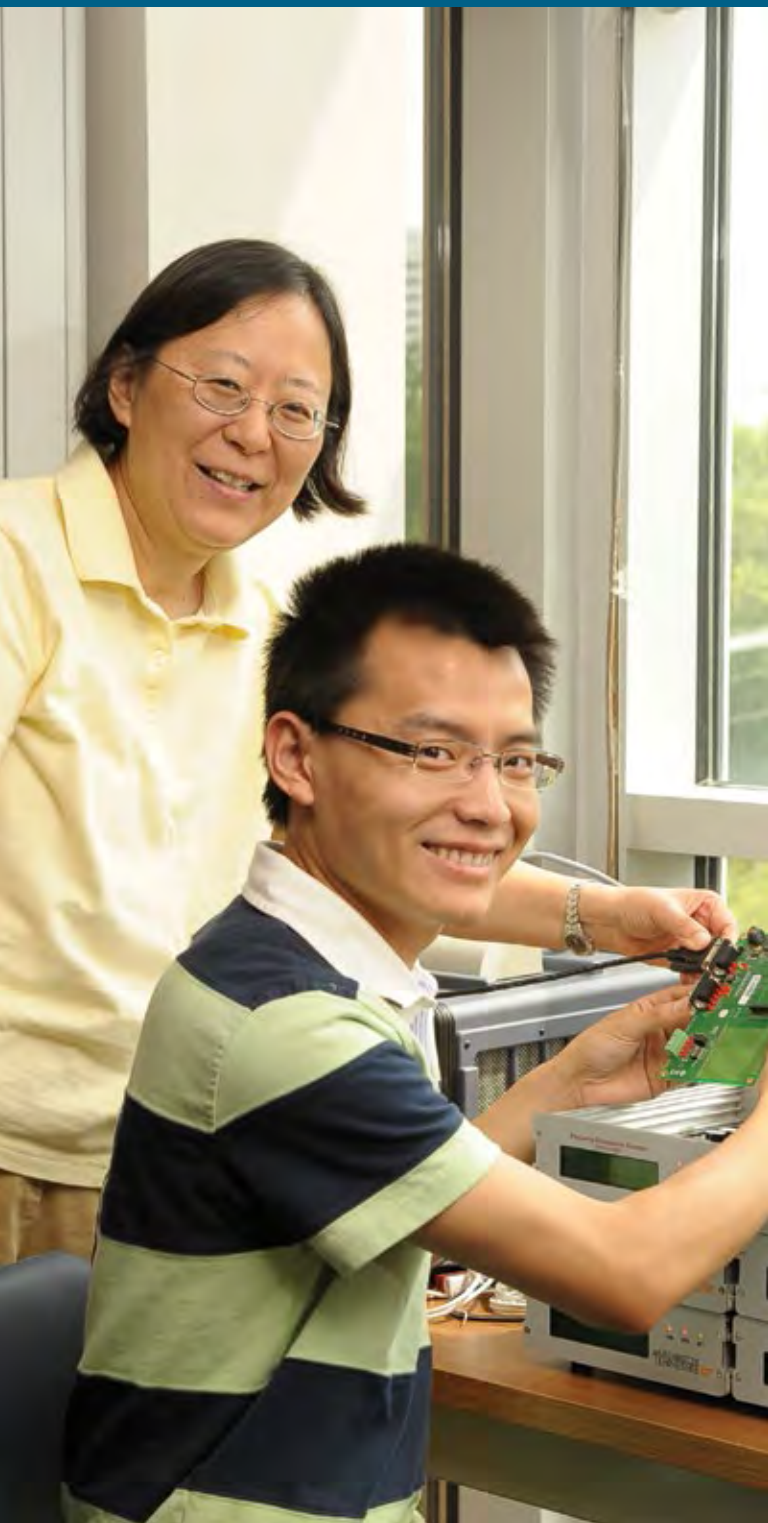
You can find more information on the residence halls at the UT Housing website:
<http://housing.utk.edu>

You may also want to check out information on meal plans and campus dining services online:
utdining.utk.edu

Computer requirements

Laptop computers are required for all freshmen in the College of Engineering. Minimum specifications for computers may be found on the home page of the college's website:
www.engr.utk.edu/futurestudents/computers





Dr. Yilu Liu (left) and student Yong (Frank) Liu work together in one of the CURENT laboratories.

Dr. Yilu Lu

Governor's Chair,
Electrical Power Systems

Co-director, Center for Ultra-wide-area
Resilient Electric Energy Transmission
Networks

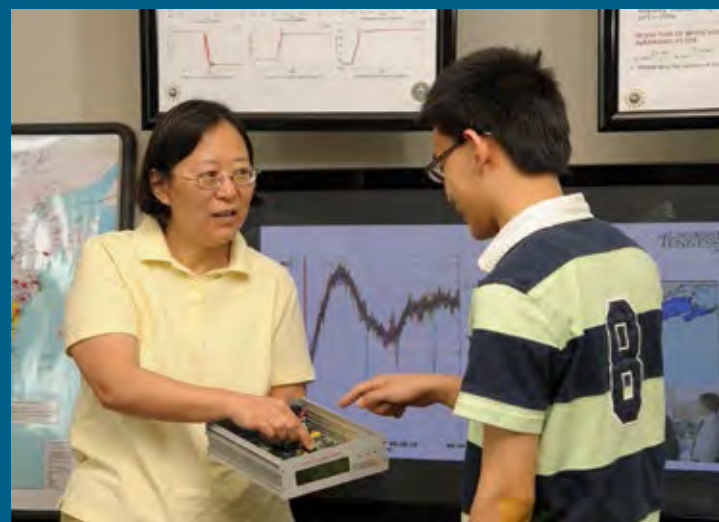
Professor of Electrical Engineering and
Computer Science

“As an educator, my work is to help train a new generation of highly motivated students to achieve their full potential and to become leaders in their future roles as electrical engineers, managers, and innovators.

By working closely with our undergraduate and graduate students, we help conceive, design, build, and monitor the smart power grids of the future. We challenge students to think, to create, and, to learn how to work as a team and to gain hands-on experience.

The University of Tennessee is an excellent choice for an engineering education. In addition to the high academic standards and our international reputation in many engineering areas, we offer a unique opportunity to connect with industry and national labs at a very early stage.

The college is dedicated to providing a rich experience for our students that will last a lifetime.”



Dr. Yilu Liu and Frank Liu in one of the CURENT laboratories.

Biosystems Engineering & Soil Science

Graduates design and develop processes involving natural systems to enhance resource use and production of foods, biofuels, and other biobased products while maximizing sustainability and minimizing environmental impact, all through application of a broad-based expertise in biology, chemistry, physics, and engineering sciences. <http://bioengr.ag.utk.edu/>



Chemical & Biomolecular Engineering



Chemical engineering encompasses the development, design, operation, and management of plants and processes for economical,

safe conversion of chemical raw materials to useful end products. Biomolecular engineering encompasses system biology, protein engineering, genetic engineering, and medical applications. Chemical and biomolecular engineers normally work in fields such as pharmaceuticals, fuels production, semiconductors, chemicals, petroleum, and environmental restoration. www.engr.utk.edu/cbe

Civil & Environmental Engineering

This field is concerned with designing the infrastructure of our society. This area includes construction, transportation, energy needs; dealing with climate change, pollution, and other environmental problems; and



the design and development of urban areas. Civil engineers are usually employed in the construction field as structural or geotechnical designers on buildings, bridges or transportation systems. Environmental engineers identify, evaluate, and resolve concerns about the environment. www.engr.utk.edu/civil

Electrical Engineering & Computer Science



Electrical engineering concerns the application of the physical laws of electricity and magnetism to design devices and systems.

This field impacts all aspects of modern life from miniature integrated circuits to large-scale power systems. Computer science and computer engineering explore issues of information and computation spanning both hardware and software. Graduates work in virtually all fields, including: artificial intelligence, biomedical devices, bioinformatics, computer networks, image and signal processing, and robotics. www.eecs.utk.edu

Industrial & Systems Engineering

While other types of engineers design things, industrial engineers design the systems that enable things to work effectively. Industrial



engineers design, install, improve, and control large, complex systems that include the integration of people, materials, machines, and facilities, with wide-ranging applications including manufacturing, transportation, construction, healthcare, retailing, entertainment, public service, and finance. www.ise.utk.edu

Materials Science & Engineering



This discipline is primarily involved with the processing and testing of engineering materials (metals, ceramics, polymers,

composites, semiconductors) and the relationships between processing, properties, performance, and internal structure.

Developments in materials science and engineering are on the cutting edge of modern technology, as new and improved materials are critical to the development of advanced products.

Materials science engineers are important in the development of many applications, including automobiles, aircraft and spacecraft, surgical implant devices, alternative energy technologies, computers, optical displays, textiles, and sports equipment. www.engr.utk.edu/mse/

Mechanical, Aerospace & Biomedical Engineering

Mechanical Engineering – a broad area of engineering that focuses on either mechanical systems, things like automobiles, material handling equipment, and computer printers; or thermal-fluid systems such as power plants, heat exchangers, and air conditioners.



Aerospace Engineering – involves the design, testing and manufacturing of aerospace systems including aircraft, spacecraft, and missiles.



Biomedical Engineering – connects engineering to medicine through the design, development, and manufacturing of devices

that enhance human diagnosis, treatment, and general health. www.mabe.utk.edu

Nuclear Engineering

This area of study focuses on the application of subatomic processes for the benefit of both humanity



and the environment. Traditional nuclear engineering includes nuclear system design, analysis and sustainability; reactor safety and security; and other aspects of the nuclear fuel cycle. Radiological engineering involves the design and safe utilization of radiation for applications in industry, government, and medicine. www.engr.utk.edu/nuclear/

Melanie Smith

Civil Engineering Major Engineering Ambassador

“The College of Engineering at the University of Tennessee offers a variety of opportunities ranging from undergraduate research, internships and co-ops, and several engineering societies. Being involved in all aspects of the college has helped keep me driven to succeed. Engineering Diversity Programs Office (EDP) helped jump-start my engineering career at UT and has supported me every step of the way. I first worked as a counselor for a pre-college summer engineering camp to encourage underrepresented youth to pursue science, technology, engineering, and math (STEM) majors. I realized my passion for inspiring students to major in engineering and became an Engineering Ambassador.

The EDP office houses TLSAMP (Tennessee Louis Stokes Alliance for Minority Participation) that encourages underrepresented students to engage in research and become interested in graduate school. TLSAMP offer a multitude of resources including seminars, conferences, and a welcoming environment for students. The EDP director and staff encouraged me to pursue undergraduate research and a position on the Chapter Executive Board for The National Society of Black Engineers (NSBE). NSBE has helped me gain leadership skills and a support network of students that acted as a family. Through NSBE I learned about professionalism and was able to plan events geared towards interesting children in engineering.

Working as an undergraduate research assistant has showed me real world applications of civil engineering. My research topic is on a probabilistic analysis of the properties of composite materials. I have worked alongside established professors who deeply care about furthering my education and are eager to share their work with me. Through research, I feel that I have a better understanding of the concentration that I want to pursue and the variety of options I have as a civil engineer. I got my student position at Knoxville Utility Board



through my networking connections from NSBE. I work in the Water Systems Department and work on projects dealing with inspections and maintenance of the wastewater system and I have been able to experience what an engineer actually does in the workforce. I am very happy with my engineering experience at UT.”

Engineering Programs

Engineering Professional Practice

Cooperative education and Internships



Since 1926, the Office of Engineering Professional Practice since 1926 has worked with employers from across the country to provide experiential, cooperative education opportunities for students in the form of multi-term assignments (traditionally known

as co-op) as well as single term assignments (traditionally called internships) to supplement classroom learning with hands-on experience, helping them develop both professionally and intellectually. Program participants also have access to leadership development activities while on assignment and upon their return to campus. This combination of industry-based work experiences and leadership development

activities prior to graduation provide a head start to students on their journey to success beyond graduation. www.coop.utk.edu

Honors Program

The College of Engineering Honors Program provides an opportunity for academically qualified students to experience a more challenging preparation for their chosen engineering discipline. The students in this program are selected primarily from students enrolled in the Chancellor's or Haslam Honors program but other well-qualified students may also apply. www.engr.utk.edu/academics/honors.html

Engineering Study Abroad Programs

Engineering Study Abroad Programs allow you to stay one semester or shorter in English-speaking or foreign-language based schools throughout the world. You can choose between individual trips or pre-arranged faculty-led trips, where you would live and travel with a small group of UT students. www.engr.utk.edu/outreach/





The Office of Engineering Diversity Programs

Pre-College Summer Programs

The College of Engineering offers summer enrichment programs for rising middle school and high school underrepresented students. The objective is to provide an introduction to engineering, showcase the applications of math and science, and learn what engineers do in the real world. Participants learn about careers in engineering, explore university campus, tour engineering labs and facilities, compete in engineering challenges, and jumpstart their academic career. The programs include the Middle School Introduction to Engineering Systems for rising seventh and eighth graders (MITES7 and MITES8); Engineering Volunteers for rising ninth and tenth graders (eVOL9 and eVOL10) and High School Introduction to Engineering Systems (HITES) for rising eleventh and twelfth graders. www.engr.utk.edu/diversity/pre-college/

Tennessee Louis Stokes Alliance for Minority Participation

The Tennessee Louis Stokes Alliance for Minority Participation (TLSAMP) Program is designed to increase the enrollment and graduation rate of underrepresented ethnic minority students



(Hispanic, African-American, American Indian, Alaskan Native, and Pacific Islander) in science, technology, engineering, and mathematics (STEM) by at least 100% at the end of the five year period. The objectives to support the goal of the alliance are to: recruit underrepresented students to pursue science or engineering as a career, improve the quality of the learning environment for underrepresented science and engineering students at all schools; and ensure that a larger number of undergraduate students are prepared to enter graduate programs. TLSAMP offers monthly seminars, tutoring, peer mentoring, and graduate school preparation. <http://tlsamp.utk.edu>

National GEM Consortium

The University of Tennessee, Knoxville, is a proud member of the National GEM Consortium. The mission of The National GEM Consortium is to enhance the value of the nation's human capital by increasing the participation of underrepresented groups (African Americans, American Indians, and Hispanic Americans) at the master's and doctoral levels in engineering and science. GEM prepares technical leaders for advanced careers in industry, academia, and government agencies by identifying and selecting highly qualified students to complete a program of science, technology, engineering, and mathematics (STEM) graduate study and industry internships. Through university and employer members, and other strategic partners, GEM develops funding to award fellowships and builds mentor networks to support Fellows in achieving academic and professional success. www.gemfellowship.org/

Jarrod Edwards

Mechanical Engineering Major,
Co-op Participant
Engineering Ambassador

“Choosing to major in engineering at The University of Tennessee has been one of the best decisions I’ve made thus far in my undergraduate collegiate career, and I continue to benefit from it in new ways every day. Many of my professors have both industry experience and extensive research backgrounds and enjoy taking every available opportunity to relate academic coursework with practical application. This carries over into our project assignments, many of which are based on real-world design problems that help to spark interest and collaboration among students, challenging them to leverage the skills they learn in textbooks and lectures into coming up with creative and innovative solutions.

Beyond the classroom, the College of Engineering does an excellent job of creating opportunities for students to gain work experience that will better prepare them for the career they are pursuing. Each year, the Engineering Professional Practice Office hosts an Engineering Expo seeking promising students interested in internships and co-op assignments that will offer quality work experience and the chance to network with full-time engineers and business professionals. I can personally attest to the value of this program as I’ve had the opportunity to complete a multi-term co-op assignment with Eastman Chemical Company in Kingsport, Tennessee. The practical knowledge I’ve gained and the friendships I’ve made through this experience has only underscored that mechanical engineering is the right field of study for me.

In addition, UT’s College of Engineering is focused on developing future leaders. The Engineering Ambassador program, of which I am a member, offers upperclassmen the chance to share with aspiring future engineering students the many great opportunities available through the engineering college. Members of this small



team of volunteers conduct daily tours of the engineering classrooms and facilities; provide insight on majors, classes, and professors; and field a variety of questions about life as an engineering major as well as those dealing with the broader University of Tennessee student experience. I’m also growing more involved in an engineering honor society into which I was inducted last year, and am serving in several campus leadership positions outside of my engineering life.

So if you’re seriously considering a career in engineering and want to attend a top tier university with excellent faculty, new state-of-the-art facilities, and an exciting vision for the future, look no further. The University of Tennessee’s College of Engineering meets all of these expectations, and I’ve grown into a better student and a stronger leader during my time here. I encourage students to broaden their horizons as they prepare for their futures, and I can attest that UT provides many opportunities to do so.”

Life on Campus and Beyond

Engineering students lead a busy life! Lectures and labs require focus, time commitment, and hard work. The amount of out-of-class study you need will depend on how much you are willing to work to achieve your academic goals. An engineering student who is a good time manager will be able to schedule social activities and other extracurricular involvement after classes and in the evenings.

UT is a national leader in collegiate sports and boasts a wide range of campus organizations with more than 300 social, sports, academic, religious, and special interest clubs.

The university is located in a growing, progressive city with easy access to the beautiful Great Smoky Mountains National Park, scenic TVA lakes of the Tennessee River, and many nearby national scenic recreation areas.





Adele Poole

2013 Industrial & Systems Engineering
Graduate

Supply Chain Analyst
Integrated Global Supply Chain,
Center of Excellence
Eastman Chemical Company

The University of Tennessee College of Engineering is rooted in tradition but is always facing the future. Students of this program walk away with a strong foundation in traditional engineering, but we are offered a great deal more as well. As a freshman, the Engage program welcomed me into a community of hard work and camaraderie. The friends I met there remain my friends and colleagues years later. The career resources offered by the college helped me navigate to my co-op with Eastman Chemical Company, a global specialty chemical company, where I now work as a full time Supply Chain Analyst today.

The College of Engineering taught me the two most powerful skills there are to take into the workforce—sharp problem solving skills and the ability to work in a team. Though these skills are key to any work, I find them especially crucial working in supply chain. Every day I am balancing the functionality of world-class software applications, like SAP, with the best practices for supply chain planning and execution. I am challenged to create the best solution by bringing people and technology together. Even as a new employee, I am able to leverage the leadership skills I acquired at the University of Tennessee to lead training classes and complex projects with seasoned team members.

Somewhere along the way, school turned into graduation, and graduation became a career. There is one thing that will never change. I am proud to be a Vol for Life!



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COLLEGE OF ENGINEERING

If you are interested in a superior engineering education, contact the University of Tennessee College of Engineering or take a campus tour!

Call, write or e-mail the address below:

Office of Engineering Academic and Student Affairs

UT College of Engineering

101 Perkins Hall

Knoxville, TN 37996-2011

E-mail: coe@utk.edu

Phone: (865) 974-2454

Web: www.engr.utk.edu

For engineering campus tours, visit:

www.engr.utk.edu/ambassador/tours.php

The University of Tennessee is an EE/AA/Title VI/Title IX/Section 504/ADA/ADEA institution in the provision of its education and employment programs and services. All qualified applicants will receive equal consideration for employment without regard to race, color, national origin, religion, sex, pregnancy, marital status, sexual orientation, gender identity, age, physical or mental disability or covered veteran status.

DOP: 10/15 PAN: E01-1302-009-16