COLLEGE OVERVIEW

The University of Tennessee, Knoxville, is designated by the Carnegie Foundation as a Research University with Very High Research Activity. Over the past several years, research in the Tickle College of Engineering (TCE) has grown by leaps and bounds with increases in funding, leadership positions, and new facilities as well as significant growth in PhD student involvement.

Productivity

• Since 2008, TCE’s research expenditures have doubled, with $85M annually from NSF, DoE and UT-Battelle, DoD, industry, the State of Tennessee, and other federal and private agencies
• TCE accounts for about 50% of all UT Knoxville externally awarded research expenditures

Engineering Research Support

The Engineering Research Office partners closely with UT’s Office of Research and Engagement and is a difference maker for accelerating new-faculty funding success while providing research proposal support for all faculty members, particularly with respect to growing DoD funding.

Faculty

• 168 tenure-line, 23 lecturers/professors of practice, and 30 research faculty
• 5 NAE and NAI members; 12 UT-ORNL Governor’s Chairs; 2 Distinguished Scientists; and 48 endowed chairs, endowed professorships, and faculty fellows
• 17 Early Career awardees (NSF, DoE, DARPA, and ARO) since 2016

Intellectual Property

TCE is firmly committed to translating basic research outcomes to technology solutions for society through intellectual property (IP) development. TCE faculty members are among the most active participants in the technology commercialization efforts of the UT Research Foundation.

In the past 2 years, TCE has yielded 244 IP disclosures, 19 patents, 15 licenses/options, and 2 startups.

Undergraduate Research

Many students participate in Research Experiences for Undergraduates, senior design projects, internships, federally supported research grants, and ORNL research appointments.

In AY2018, about 300, or 10%, of undergraduates pursued research projects with supervision from over 100 faculty members on campus, at JIAM, at ORNL, and off-site locations such as the Thomas Jefferson National Accelerator Facility.

New Engineering Complex

The 228K-sq-ft, state-of-the-art building will open in 2021 and house the Stoneking engage Engineering Fundamentals and Cook Grand Challenge Honors programs, the Min H. and Yu-Fan Kao Innovation and Collaboration Studio, the top-ranked Department of Nuclear Engineering, and flexible research laboratories.

tiny.utk.edu/nec

RESEARCH SUMMARY

TICKLE.UTK.EDU/RESEARCH

RESEARCH STRENGTHS

The increasing quality of our faculty and the broad capabilities of our facilities have diversified the college’s research portfolio across a wide variety of areas. Particular areas of strength include:

Energy Research

• Pioneering technologies for resilient and sustainable power grids to improve power grid performance
• Converting biomatter to clean, sustainable biofuels
• Creating novel, smart devices for efficient conversion and storage for power electronics and systems

Innovative Advanced Manufacturing

• Improving hybrid and soft materials and fabrication for novel functionality and sustainable processing
• Enabling real-world additive manufacturing through nanoscale welding and 3D printing strategies for metals

Next Generation Materials

• Creating customizable 2D functional materials for superior superconductors, magnets, and quantum computers
• Developing new scintillators to improve medical imaging, homeland security, and nuclear non-proliferation
• Engineering materials for extreme environments like nuclear reactors, hypersonic flight, and outer space

Future Computing

• Leading research in software and hardware development for future exascale computing
• Designing adaptive, self-learning neuromorphic computers for real-time data analysis

Revolutionary Aviation

• Reimagining wing design for faster, more fuel efficient, and safer next-generation commercial aircraft
• Developing and testing designs, materials, and manufacturing solutions for sustained hypersonic flight

Robotics and Smart Technologies

• Linking the brain-computer interface via non-invasive technologies to enhance human performance
• Designing and testing computer-assisted technologies for rehabilitation, prosthetics, and surgical procedures
• Advancing smart health-management technologies to collect, integrate, and interpret real-time health data

Environmental Engineering

• Harnessing sensor technologies, data analytics, and high-performance computing for dynamic urban systems
• Remediating contamination and wastewater and protecting environmental resources through microbial engineering
RESEARCH INSTITUTES AND CENTERS

UT Space Institute
Located in Tullahoma, Tennessee, UTSI provides a unique blend of facilities for large-scale aviation research, including a high-speed wind tunnel, propulsion laboratory, large vacuum chamber, and high-temperature combustion facility.

www.utsi.edu

Institute for Advanced Composites Manufacturing Innovation
IACMI is a UT-led $259M private-public partnership focusing on advanced fiber-reinforced polymer composites combining strong fibers with tough plastics to yield materials lighter and stronger than steel.

iacmi.org

Center for Ultra-Wide-Area Resilient Electric Energy Transmission Networks
A collaborative Engineering Research Center funded mostly by the National Science Foundation and DoE, CURENT works closely with industry to improve the power grid through breakthrough monitoring, response techniques, and devices.

curent.utk.edu

Innovative Computing Laboratory
A world leader in enabling technologies and software for high performance computing, ICL provides state-of-the-art tools to tackle challenging problems and develop scientific computing standards.

icl.utk.edu

Scintillation Materials Research Center
SMRC is supported by Siemens Medical Solutions and federal agencies for the discovery and development of new scintillation materials with applications in medical imaging and national security.

tickle.utk.edu/smrc

Center for Transportation Research
CTR addresses technical and policy issues about highway safety, railway and inland waterway systems, transportation economics and planning, and traffic demand modeling with support from the Tennessee Department of Transportation and the federal government.

ctr.utk.edu

Center for Materials Processing
Designated by the State of Tennessee as a Center of Excellence, CMP supports teaching and conducting basic and applied research that emphasizes relationships among processing, structure on various scales, and properties of all classes of materials. CMP fosters faculty and student relationships with industrial partners through a variety of memberships.

cmp.utk.edu

PARTNERSHIP WITH OAK RIDGE NATIONAL LABORATORY

The decades-long UT-ORNL partnership links complementary expertise and resources to provide unparalleled research and education opportunities through shared faculty and facilities and direct research funding. The relationship was strengthened in 2000 when UT-Battelle LLC assumed management of ORNL.

Collaborative efforts include Governor’s Chair, Distinguished Scientist, and Joint Faculty programs as well as the Bredesen Center for Interdisciplinary Research and Graduate Education. Facilities available to TCE include the Spallation Neutron Source, High Flux Isotope Reactor, and Manufacturing Demonstration Facility. For both TCE and ORNL personnel working at UT, research is supported by more than $12M in annual ORNL funding.

Joint UT-ORNL Governor’s Chair Program
This program has brought more than a dozen world-renowned researchers to the college, positioning both institutions as thought leaders in several fields. The funding brought in by these professors is measured in the tens of millions, while the research done under their watch has elevated the intellectual capacity of UT and benefited doctoral, graduate, and undergraduate students through research opportunities.

govchairs.utk.edu

Joint Institute for Advanced Materials
JIAM is an interdisciplinary faculty community focused on creating novel quantum materials, advanced functional materials, and next-generation soft polymers.

jiam.utk.edu

Joint Institute for Computational Sciences
JICS develops and deploys advanced leadership computing facilities including ORNL’s exascale computer, Summit, that was officially sanctioned as the world’s fastest supercomputer in June 2018.

jics.utk.edu