



THE UNIVERSITY OF
TENNESSEE
KNOXVILLE

UNDERGRADUATE RESEARCH



Office of Undergraduate Research

Annual Report

2014-2015



Welcome to Undergraduate Research at the University of Tennessee, Knoxville! We are proud to highlight the growth of the student research enterprise, in our 2015 Annual Report.

Undergraduate Research is “an inquiry or investigation conducted by an undergraduate student that makes an original intellectual or creative contribution to the discipline.” It is our mission to ensure all students are provided the opportunity for academic engagement through research-based, experiential learning experiences.

We know Undergraduate Research has a profound impact on a student’s college experience including improved academic success, increased graduation rates, pursuit of an advanced degree, knowledge of potential career paths, and improved critical thinking skills. Students can undertake research alongside a faculty mentor during the academic year or summer. Students may also choose to pursue an experience at a national laboratory, museum, company, or at another university during the summer.

This past year we celebrated our students’ achievements through many activities and events including the 19th Annual Exhibition of Undergraduate Research and Creative Achievement also known as EURēCA. We also saw three students accepted to present their research to Congress during Posters on the Hill in Washington, D.C. and we attended the 3rd Annual SEC Symposium with a van load of students.

Amongst the programs and special events you will read about in this Annual Report, we also offered several ongoing activities for students including a new seminar series covering the most requested topics from our office such as getting involved in research, navigating the IRB, and crowdfunding your research idea. New support services for faculty included assistance with grant writing for the support of undergraduate students, consultation on education plans for federal proposals, and finding funding to support summer research students.



We look forward to introducing you to the world of Undergraduate Research and hope you will continue to join us on our journey for years to come.

Sincerely,

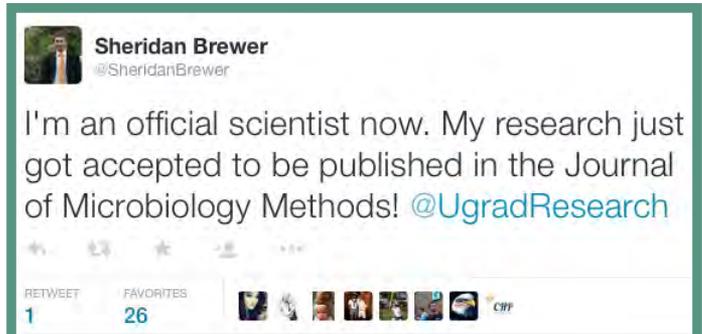
A handwritten signature in black ink that reads "Marisa Moazen".

Marisa Moazen
Director

Overview

The Office of Undergraduate Research serves as an umbrella for on-campus faculty mentored research and a bridge for connecting students to opportunities outside of the University of Tennessee, Knoxville. Our location, within the Office of Research and Engagement, provides a great connection to the research enterprise of the university.

Amongst the programs and special events highlighted in this report, we also offer many day-to-day activities for students. In spring 2015 we launched a seminar series covering the most requested topics from our office such as how to get involved in research and navigating the IRB. We continued the one-on-one mentoring sessions with students and added faculty support services which included proposal assistance when including undergraduate research, consultation on education plans for federal proposals, and finding funding to support summer research students.



Tweets of undergraduate researcher's accomplishments gain a lot of attention.



An article on undergraduate research made it to the front page of the Knoxville News Sentinel.

Research Week



Smokey poses with a student in Hodges Library during Research Week.

The 6th annual Undergraduate Research Week, held April 9-18, 2015, included a wide range of activities from the Undergraduate Research Symposium to EURēCA to seminars and free pizza with Smokey. Designated by the Council on Undergraduate Research as a national time of celebration, this week celebrates and

highlights undergraduate research and creative activities that take place across campus.

Research Week Events

Exhibition of Undergraduate Research & Creative Achievement (EURēCA)

12th Annual Marco Symposium

An invited talk from Dr. Barbara Holland, Community Based Research for Undergraduates: Benefits and Challenges

6th Annual Undergraduate Research Symposium sponsored by URSA

School of Art Graphic Design Open House

WomEngineers Day

UT Veterinary Medicine Open House 2015

Volunteer Day at the Archaeological Research Lab

Women in STEM Research Symposium for Undergraduate and Graduate Student Researchers

Big Orange STEM Symposium

Various Departmental and Undergraduate Research Seminars



To encourage all students to visit the EURēCA posters, pizza was served in Hodges Library during Research Week. Smokey also made an appearance and visited students in The Commons.

“Participating in research is the ultimate pathway for taking ownership over one’s education. It’s a process of identifying interests and passions, and asking for someone to help you more—asking to be handed the tools to delve into these subjects further and to engage with these facets of knowledge that first sparked your interest in a classroom. Undergraduate research transforms the students that seek this commitment to academic exploration.”

—Kenna Rewcastle '15



EURēCA

The Exhibition of Undergraduate Research and Creative Achievement

The University of Tennessee offers undergraduates the opportunity to move beyond the classroom and explore the excitement of original research and creative projects. The Exhibition of Undergraduate Research and Creative Achievement (EURēCA) - a multi-day exhibition and performance event for students – is held each spring to celebrate original and creative works by undergraduate students and is the highlight of Research Week. Moreover, EURēCA recognizes the importance of faculty in providing mentoring to students in their academic and professional disciplines. This process encourages, supports, and rewards undergraduate participation in the campus research enterprise.



The posters remained in Hodges Library after the judging and were open for public viewing.

The 19th Annual Exhibition of Undergraduate Research and Creative Achievement event was held April 13 – 15, on the 1st and 2nd floors of the John C. Hodges Library. The exhibition represented faculty-mentored undergraduate research in all disciplines across campus, presented as individual or team projects in the form of posters, musical works, or digital video in a gallery-like area.

This three-day event included over 420 student presenters, more than 220 student posters and exhibits, and awards presented to 127 students. Students were awarded over \$19,000 in prize money for their research and creative work.



The first floor of Hodges Library housed posters from Art, Architecture and Design, Arts and Sciences, Engineering, and displays that included audio and video.



Participants present their research to judges that are knowledgeable in their field of study. Faculty, students, and other visitors also discussed with participants.



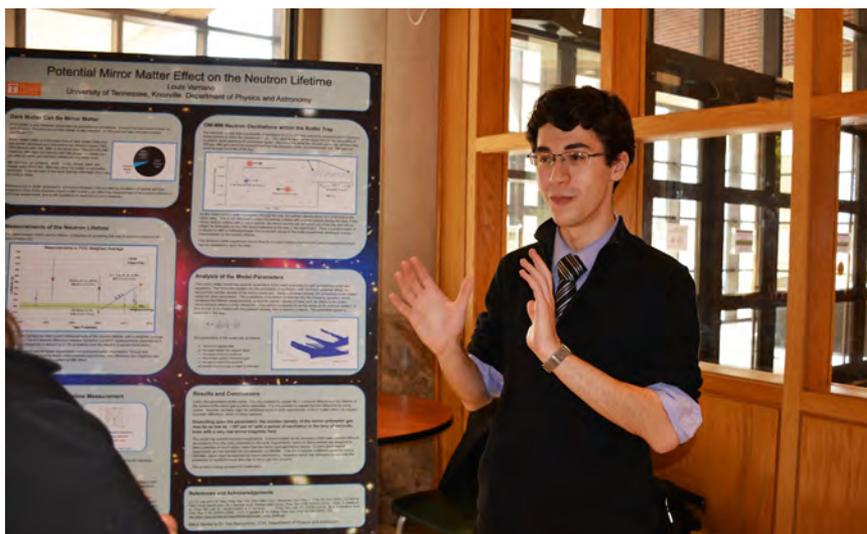
Judges are unique to each college and work together to decide overall winners.



URSA

Undergraduate Research Students' Association

The Undergraduate Research Students' Association (URSA) was founded in 2010 as a student organization dedicated to expanding access to undergraduate research at the University of Tennessee. Its goals are to foster an undergraduate research community and culture at UT, to help connect students and faculty in undergraduate research positions, and to promote undergraduate research. URSA has aided many undergraduates in their research goals by providing mentorship, advice, and editing.



URSA member Louis Varriano presents his research on dark matter at Posters at the Library.

Each year, members of URSA coordinate the Undergraduate Research Symposium,



A student presents at a recent URSA Undergraduate Research Symposium.

workshops on student involvement in undergraduate research, the publication of Pursuit, and numerous seminars from connecting with a faculty mentor to opportunities for presenting and publishing. URSA also works with other student organizations on campus, as well as faculty and the administration, to promote undergraduate research and to expand the ability of every student to get involved.

Undergraduate Research Symposium

URSA's Undergraduate Research Symposium is a celebration of undergraduate research that seeks to affirm and support undergraduates' valuable contributions to research and knowledge in all disciplines, whether they work independently or with faculty members. It offers students the opportunity to present their research in an oral presentation or a similar form, as the case may be for some research and creative projects. The Symposium attempts to mirror professional conferences with formal, 15-minute presentations from students given to a general audience.



URSA members assist in the set up of the 6th Annual Undergraduate Research Symposium.

The 6th Annual Undergraduate Research Symposium was held in the John C. Hodges Library, and included 24 sessions with students from across campus presenting their research. More than 80 students presented their research throughout the day, resulting in a 42-page proceedings book that collects and commemorates the abstracts of each of the presenters. The Symposium was sponsored in part by the Office of Undergraduate



Faculty and students gather at a recent URSA Undergraduate Research Symposium.

Research, the Department of Biosystems Engineering & Soil Science, the Department of Child & Family Studies, the Department of Earth & Planetary Sciences, the Department of Entomology & Plant Pathology, the Department of Materials Science & Engineering, the Department of Microbiology, the Department of Nuclear Engineering, the Department of Psychology, and the Department of Theory & Practice in Teacher Education, at the University of Tennessee, Knoxville.

Posters at the Library

Every February, undergraduate researchers from across Tennessee converge upon the Tennessee State Capitol in Nashville to share their projects with legislators. “The projects represent significant discoveries and achievements that build new knowledge, solve emerging problems, and expand creative thinking essential to healthy, productive society,” says Joseph A. DiPietro, UT President. “Our undergraduates’ areas of expertise reflect world-class research and creative activity that elevate our students and advance the frontiers of knowledge.



Julie Rich explains her research titled *Dominance of Old End Growth is Inherited in Fission Yeast* outside of the Mary Greer Room in Hodges Library.

Senator Richard Briggs and James Ghawaly discuss his poster titled *Design and Fabrication of a Remote Control System in an Aerial Radiation Detection Platform*.



We’re pleased to showcase these students’ work, providing a small window to the excellence going on within our classrooms and laboratories every day.”

In its tenth year, eight students from UT, Knoxville were chosen to travel to Nashville to present their posters in the Legislative Plaza, lunch with legislators, meet the governor, and explain their projects. Unfortunately, snow and ice kept our group from travelling and necessitated a rescheduling of the event. Our students presented their posters at the John C. Hodges Library during a special event. State legislators from our region were invited to the event as well as students, faculty, and the public, and had the chance to meet the students and discuss their research on the Knoxville campus.

Posters on the Hill

Posters on the Hill offers college students the opportunity to present their research in Washington, D.C. Hosted by the Council on Undergraduate Research (CUR), this prestigious event selects 60 student research posters from colleges and universities across the United States to be presented to U.S. Congress members and their staffers.



Pictured are members of Senator Lamar Alexander's staff with Oldham, Messing and Roschli.

In its 19th year, CUR selected two UT, Knoxville posters for inclusion at the event, ending a period of more than ten years without a UT student's participation. CJ Oldham, Andrew Messing and Alex Roschli met with Representative Jimmy Duncan, members of Senator Lamar Alexander's office, and attended a meeting at the White House with members of the White House Office on Science and Technology Policy.

Roschli and Messing present their research poster in Washington, D.C. that shows their work with 3D printing.



Messing and Roschli's project, *Big Area Additive Manufacturing*, was guided by Lonnie Love, ORNL's Automation, Robotics, and Manufacturing group leader. Oldham's project, *A Comparison of Surrogate Nuclear Melt Glass Samples to Trinitite*, was guided by Howard Hall, UT-ORNL Governor's Chair.

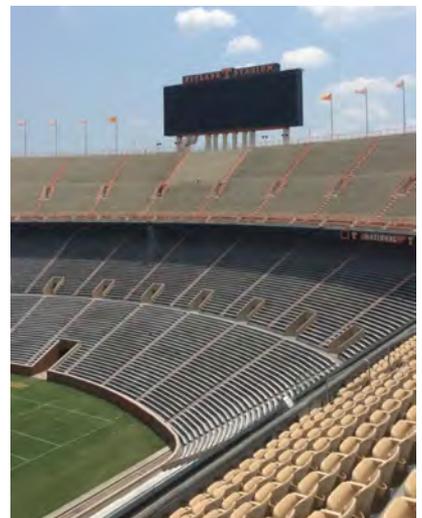
Summer Research Scholars



Over 100 students, both from UT and visiting colleges, ate lunch together in the Wolf Kaplan Hospitality Center in Neyland Stadium.

Students choose to stay on campus and conduct summer research for many reasons. Sometimes their course-load precludes participating in research during the academic year, some want to continue existing projects into the summer, or stay here or even travel to other college campuses to participate in summer-only research opportunities.

The Summer Research Scholars Program provides access to centralized social and professional development activities across campus. Faculty mentors hosting single undergraduate researchers or full programs can have their students participate. For summer 2015 centralized activities included a welcome lunch and tour of Neyland Stadium, several trainings including responsible conduct of research, human subjects research, and biosafety; a cross cultural mentoring seminar; a tour of Oak Ridge National Laboratory; industry guest speakers; and a joint poster session.



Students also got a tour of Neyland Stadium.

238 students joined us for Summer 2015.

238 *Total Undergraduate Summer Research Scholars*

185 UTK Undergraduates / 53 Non-UTK Undergraduates



Count of Career Objectives

Academic (Research focus, some teaching)	29%
Academic (Teaching and Research)	15%
Government	12%
Industry	25%
Other	19%

168 unique faculty mentors
Over 70 departments across 9 colleges

Programs Represented

Chemistry REU*
CURENT*
JICS REU*
Microbiology REU*
NIMBioS*
RISER*
Summer Research Institute
Summer Undergraduate
Research Internships
TN-SCORE*

**NSF Funded*



Highest Degree Interested in Attaining

BA/BS	14%
MA/MS	20%
MD	6%
MD/PhD	10%
Other Professional	7%
PhD	43%

81% of summer research positions are paid!

ORNL

Oak Ridge National Laboratory



University of Tennessee students working on campus at ORNL.

Each year students from around the world visit Oak Ridge National Laboratory (ORNL) to conduct research. Thanks to our close proximity and joint priorities, our students have the unique advantage to participate in national laboratory research without leaving home. During the summer of 2015, more than 110 UT Knoxville undergraduate students were involved in research projects at ORNL. These projects spanned all of ORNL's core mission areas (advanced materials, clean energy, national security, neutron science, nuclear sciences, and supercomputing) in addition to other areas of science and research at the lab.



Stephanie and April Gonzalez from Career Services and the Director of Undergraduate Research, Marisa Moazen, spoke at the event.

*Over 100 UT students
worked at ORNL*



Pursuit



This year's *Pursuit* Editor in Chief, Julia Ross, speaks at a recent URSA Undergraduate Research Symposium.

Pursuit: The Journal of Undergraduate Research was founded in 2009. *Pursuit* is dedicated to publishing the scholarly work of undergraduates and is supported by the Office of Undergraduate Research. The editors and review board are undergraduate students who review submissions and work with faculty and staff. *Pursuit* accepts works from all academic disciplines. Any undergraduate from any university in the world may submit. Past submissions have come from as far as China, India, and the United

Kingdom. Volume 6 included articles from 20 students, an increase of 53.8% in published submissions from the previous year. Since the journal's inception in 2011, there have been 65,101* full-text downloads of the 80 research works and 7 articles.

*Top-10 Downloaded Articles Since Inception**

How Jane Austen Uses Marriage to Get What She Wants

Hannah Eberle, 9250 Downloads

Key Factors and Trends in Transportation Mode and Carrier Selection

Keith Roberts, 5582 Downloads

Multilevel DC-AC Converter Interface with Solar Panels

Yue Cao, 5436 Downloads

Critique of Microcredit as a Development Model

Grace Levin, 2613 Downloads

The Wall Paintings of Tell el-Dab'a: Potential Aegean Connections

Sara Cole, 2604 Downloads

Bringing to Life the World's Tallest Structure

Jonathan Weigand, 2535 Downloads

Objectifying Men: Gulliver's Travels, Fantomina, and the Dildo in Eighteenth-Century Literature

Andrea K. Gill, 2400 Downloads

Beat Consumption: The Challenge to Consumerism in Beat Literature

Amien Essif, 2098 Downloads

The Construct of Resilience and its Application to the Context of Political Violence

Benjamin Doty, 1810 Downloads

The Art of Creative Conflict Resolution: A Critical Evaluation of Approaches to Post-Conflict Reconstruction in Northern Uganda

Lindsay McClain, 1765 Downloads

* as of 6/22

Summer Internships

The Summer Undergraduate Research Internships Program (SURIP) is a summer program designed to prepare motivated undergraduates for graduate study through intensive research experiences with faculty mentors and enrichment activities.

In support of both faculty and students on our campus, funding is provided to promote research and creative activity among undergraduate students. The SURIP program prepares students for graduate study, becoming academic leaders as faculty, or pursuing careers. Students receive exposure to the graduate school experience and to faculty life by participating in research across the university in many different fields.

The role of the faculty mentor is paramount, as they will provide guidance in the choice of a project and in the practice of professional approaches and methods. Projects may be a student's undergraduate thesis, a part of the faculty mentor's research program, another research project, or an ongoing project begun previously, either on an individual basis or as part of a research team. The key is that each student be involved in scholarly work independent of a classroom setting.



Part of the collection of artifacts Dano Johnson works with in the McClung Museum.



Christine Dano Johnson
Junior, American Studies

Mentors

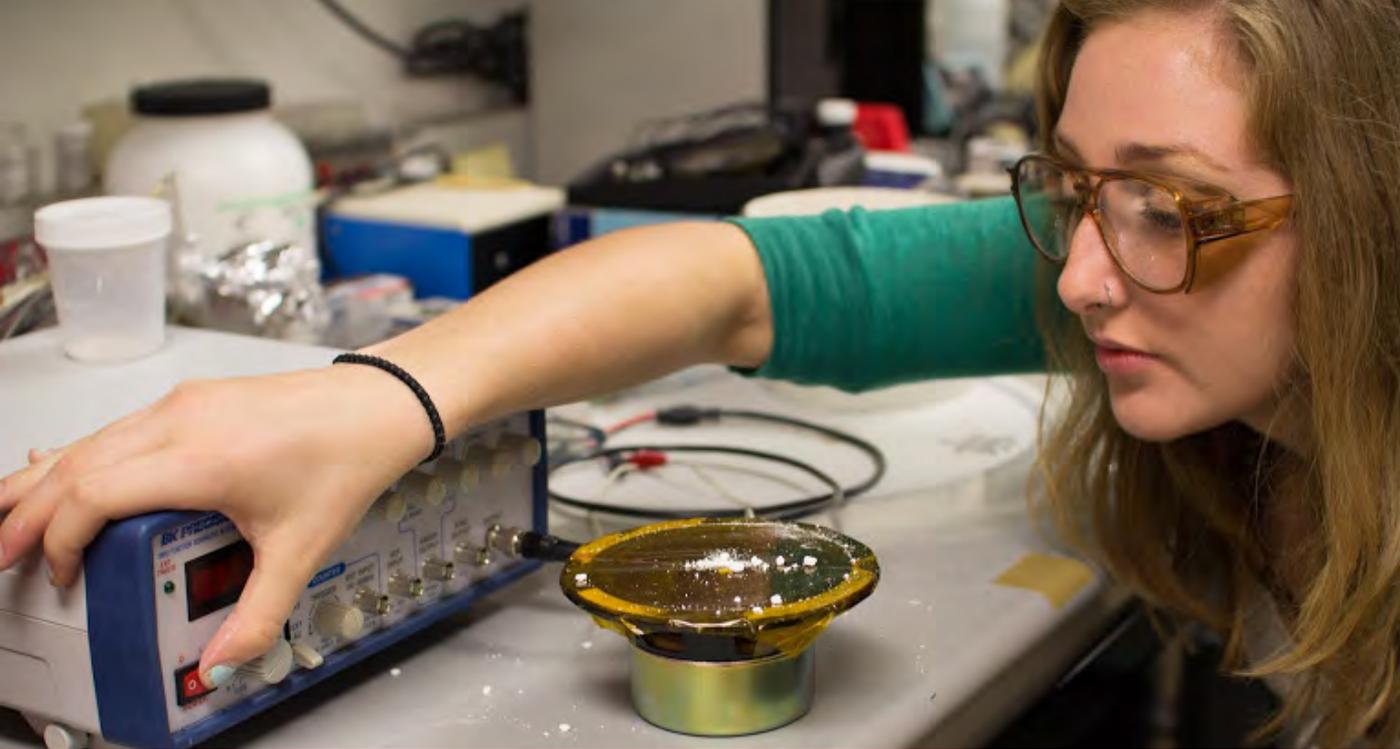
Mark Hulsether/Cat
Shteynberg

Tell Us About Your Research

I am currently researching a collection of around 100-120 Native Alaskan artifacts; primarily researching their provenance and source communities. A major part of my research is connecting with members of the source communities (via different heritage organizations, the Smithsonian Arctic Studies Center, the Anchorage Museum, etc) to collaborate in the identification and historical information regarding these artifacts, which range from the years 1870-1970.

Why Do You Do Research

I am passionate about museums, and in material culture. Alaska is one of my passions, as is helping to correct the misinformation that permeates the study and relationship with Indigenous cultures.



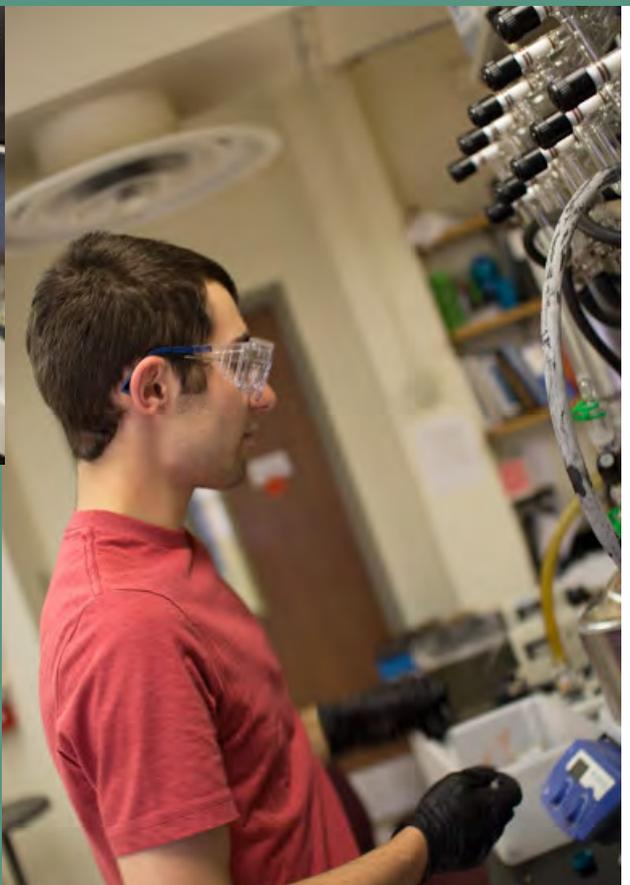
“The experience gained from my undergraduate research experience has been indispensable. Through this experience, I have found what I am passionate about, developed an intense work ethic and improved attitude, and have gained knowledge that would take years to obtain by traditional classroom learning.”

- Will Hoskins



“If you’re truly interested in making the most out of your time as an engineering student, research is an irreplaceable experience. Regardless of whether you want to be in Academia, Industry, or Government, undergraduate research not only gives you glimpse into each area but it makes everything in your classes so much more relevant and enjoyable.”

- Jesse Johnson



New Programs

The Office of Undergraduate Research is planning to launch several new campus-wide programs for the 2015-2016 academic year. These programs include:

- Cross-disciplinary Research Hubs (pilot)
- International Conference of Undergraduate Research
- Undergraduate Awards
- Federal Work-Study Student Research Assistantships (pilot)
- Discovery Day
- Smart Communities Partnership
- EXPLORE!



Dr. Cary Staples works along side a Graphic Design student at their new space in Hodges Library.

Cross-Disciplinary Research

Hubs program will provide

space for interdisciplinary teams of undergraduates and faculty to come together in a central space and tackle grand challenges. These spaces would provide the flexibility and visibility necessary to gain student interest and build teams from varied backgrounds. In some disciplines, these spaces can be equated to FabLabs or Makerspace. The pilot program is a project touching computer science and engineering, French, and art. These three disciplines are coming together under the leadership of Dr. Cary Staples to research, design, build, and test a new interface to improve foreign language learning.



Two UT students focus on their work on the new interface.

Work-Study Assistantships

In partnership with the Office of Financial Aid & Scholarships, we will launch the Federal Work Study Research Assistantships program this fall. Students will receive the opportunities and benefits undergraduate research provides – such as enhanced communication and leadership skills, refined collaborative and decision-making skills, awareness of potential career paths, increased retention and degree persistence. Faculty will be recruited to serve research mentors.

Undergraduate Research Funding Opportunities

At the University of Tennessee, the classroom is just the beginning. We believe education is about more than lectures and exams. UT students are among the best and brightest undergraduates in the nation, and we're here to make sure they're successful. We know our students have the potential to change the world, and with your help we can empower them to do just that. Within undergraduate research, we are expanding and enhancing our offerings to ensure all students are provided the opportunity for academic engagement through research-based, experiential learning.

Endowed giving opportunities exist for:

University Research Opportunities Program:

Providing paid, year-round, faculty-mentored research opportunities is important to creating a vibrant research culture on campus.

International Research Opportunities Program:

Giving undergraduate students the ability to conduct research outside of the United States.

Summer Research Opportunities Program:

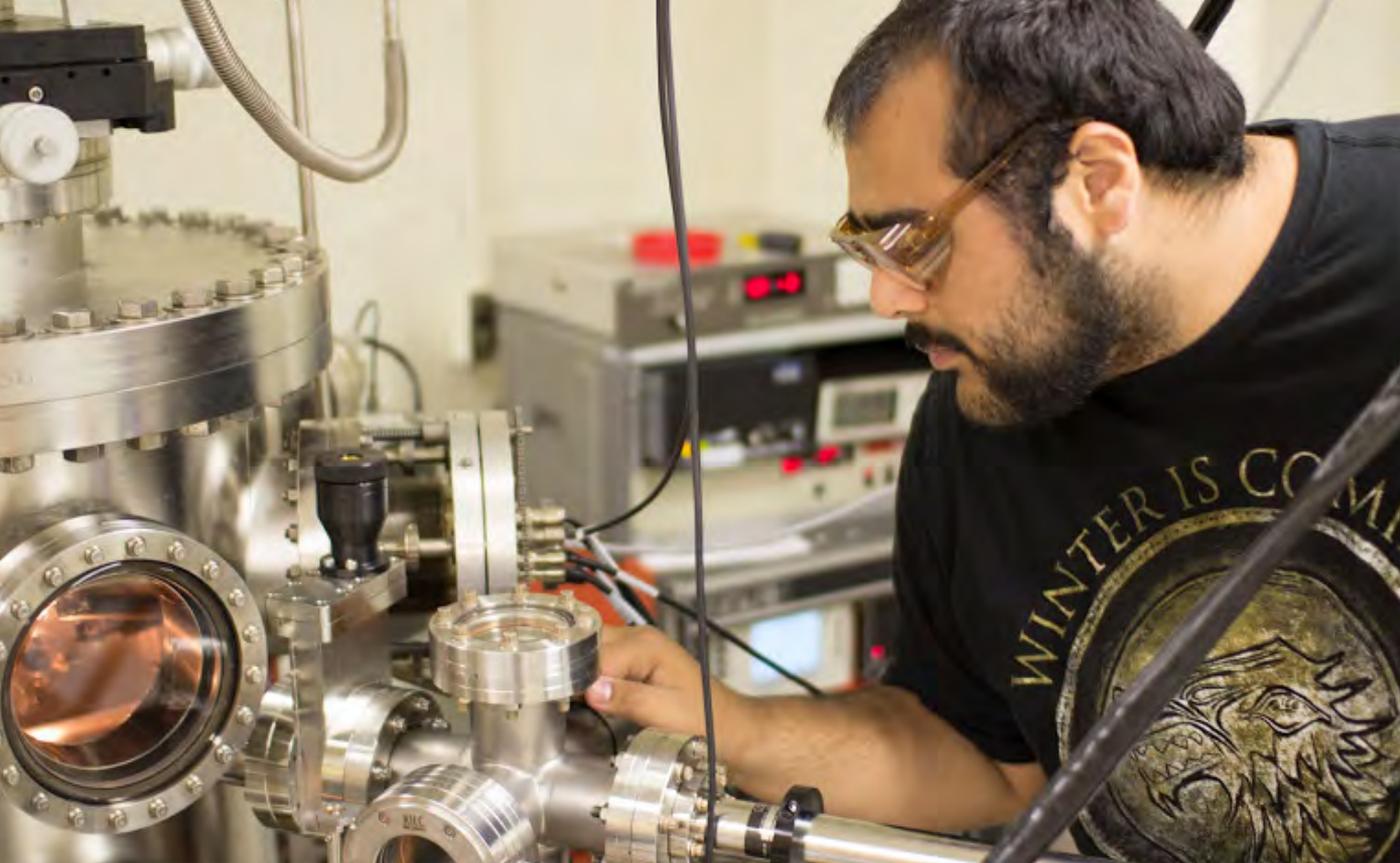
Providing the opportunity for summer research opens the door for undergraduates to conduct hands-on research, often for the first time.

Student Travel Grant Program:

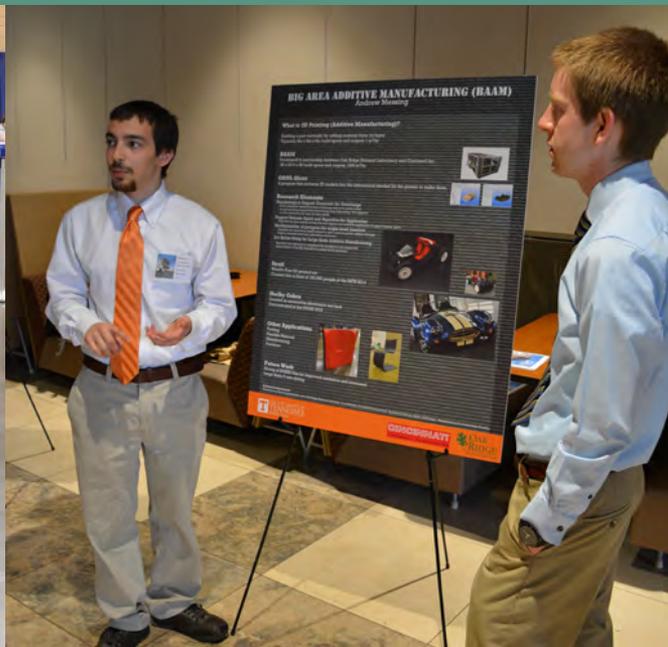
Traveling to a national conference to present self-conducted research can be a highlight in a student's academic career and a contributing factor to pursuing a graduate degree.

For more information on how to support undergraduate research, please contact the office at **(865) 974-8560** or **ugresearch@utk.edu**.





A 2015 REU participant works in a Chemistry lab. All REU participants have the opportunity to work with faculty mentors from the Department of Chemistry.



Andrew Messing and Alex Roschli worked on the 3D printed Shelby Cobra. They were also invited to present their research at Posters on the Hill and Posters at the Capitol.