

# TENNESSEE LSAMP

TENNESSEE LOUIS STOKES ALLIANCE FOR MINORITY PARTICIPATION



## NSF PROJECT IMPACT REPORT 2015

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# HISTORY OF TENNESSEE LSAMP

## Tennessee LSAMP



During the Spring of 2001, administrators at Tennessee State University (TSU) discussed the idea of TSU taking the lead on a proposal to be submitted to the NSF LSAMP program. Degree and enrollment data were compiled and reviewed by this team of administrators to determine who would be invited to participate. During that summer, the Vice President of Academic Affairs of TSU sent letters to eight academic leaders across the state of Tennessee requesting participation. LeMoyne-Owen College (LOC), Middle Tennessee State University (MTSU), the University of Memphis (UM), the University of Tennessee - Knoxville (UTK), and Vanderbilt University (VU) agreed to join this proposed partnership. The original cast included Lonnie Sharpe, Massie Chair of Excellence Professor at TSU, Muhammad Shafi, Director of Natural Sciences and Mathematics at LOC, Mary Martin, Associate Dean of Science and Technology at MTSU, John Haddock, Vice Provost at UM, James Pippin, Director Minority Engineering Program at UTK, and K. Arthur Overholser, Associate Dean of Engineering at VU. By the time the proposal was completed, Denise Jackson, Professor of Industrial Engineering at UTK had replaced James Pippin and Tom Cheatham, Dean of Science and Technology had replaced Mary Martin. President James Hefner was selected to be the principal investigator for this proposal.

# HISTORY OF TENNESSEE LSAMP

In 2013, Fisk University (FU), Nashville State Community College (NSCC), Southwest Tennessee Community College (SWTCC), and Tennessee Technological University (TTU) joined the Alliance. The present executive team includes Lonnie Sharpe, Arnold Burger, Vice Provost for Academic Initiatives at FU, Sherry Painter, Director of Natural Sciences and Mathematics at LOC, Robert Fischer, Dean of Basic and Applied Sciences at MTSU, Ronald Davis, Vice President for Academic Affairs/Student Services at NSCC, Barbara Roseborough, Interim Provost at SWTCC, Joseph Rencis, Dean of Engineering at TTU, Richard Swiegard, Dean of Engineering at UM, Masood Parang, Associate Dean of Engineering at UTK, and K. Arthur Overholser. Mark Hardy, Vice President of Academic Affairs at TSU is the principal investigator.

Phase I of the Tennessee LSAMP programs was funded by NSF from 2002 to 2008 for approximately \$3.5 million. A similar Phase II award was funded from 2008 to 2013. In 2013 an award was made for Phase III for approximately \$2.5 million and will continue through 2018.



# TLSAMP LEADERSHIP TEAM



**Lonnie Sharpe, Jr., PE** is the Massie Chair of Excellence Professor at Tennessee State University (TSU). He was appointed to that position in January 2001. This program is sponsored and funded by the Department of Energy and focuses on enhancing the

environmental efforts at the institution. Since joining TSU, Dr. Sharpe led the effort to get the NSF Louis Stokes Alliance for Minority Participation projects funded for the State of Tennessee. He also served as the Interim Dean of Engineering in 2008 and 2009

and presently serves as the Interim Dean of Life and Physical Sciences.

Dr. Sharpe has been involved in many educational and research projects over the years. He secured millions of dollars of funding while at NCA&T and was named to the University's Million Dollar Researcher Program. He was also inducted into the Million Dollar Research Club at Tennessee State University. Dr. Sharpe has authored or co-authored over 50 publications.

Dr. Sharpe received a BSME from North Carolina A&T State University in 1975, a MME from North Carolina State University in 1976 and a PhD in Mechanical Engineering in 1980 from the University of Illinois.



**Arnold Burger** earned his PhD degree in Materials Sciences from Hebrew University in 1986 and the same year he joined Fisk University. Currently Dr. Burger serves as Vice Provost for Academic Initiatives and is a full professor of physics in the Department of Life and

Physical Sciences at Fisk. He also holds the titles of adjunct professor of physics and electrical engineering at Vanderbilt and Joint Faculty Appointment (JFA) at Oak Ridge National Laboratory. Dr. Burger serves as co-

chair for SPIE's International Conference Hard X-Ray, Gamma-Ray, and Neutron Detector. He has co-authored over 400 publications and serves as Associate Editor for the journals IEEE Transactions on Nuclear Science and the Journal of Crystal Growth. He is a Co-founding Director of the Fisk-Vanderbilt Master's-to-PhD Bridge program. Professor Burger heads the Materials Science and Applications Group at Fisk, conducting research in crystal growth and radiation detectors for national security, space, and medical applications. He has co-invented nine US Patents, won four R&D 100 Awards and is Fellow of SPIE.



**Sherry Painter**, an organic chemist, serves as the Chair of the Division of Natural & Mathematical Sciences at LeMoyne-Owen College. Dr. Painter has a BS degree in Chemistry from Western Kentucky University and a doctoral degree in Physical

Organic & Biophysical Organic Chemistry from Vanderbilt University. In addition to teaching classes and administering grants in the division, her primary research area of interest is in science education. Dr. Painter is responsible for designing and implementing the "Science on Wheels" outreach project – the first mobile science lab in the Memphis, TN region servicing K-12 students and teachers.

# TLSAMP LEADERSHIP TEAM



**Joseph J. Rencis** was born and raised in Northwestern New Jersey, attended Milwaukee School of Engineering, where he received his AAS and BS degrees in Architectural and Building Construction Engineering Technology. From there, Dr. Rencis went on to earn his MS

from Northwestern University and PhD from Case Western Reserve University in Civil Engineering. From 1985 to 2004 he served as Assistant, Associate, and Professor of Mechanical Engineering at the Worcester Polytechnic Institute (WPI). From 2004 to 2010, he was Department Head and the inaugural holder of the Twenty-first Century Leadership Chair in Mechanical Engineering at the University of Arkansas, Fayetteville. He is an inaugural fellow of the Southeastern Conference

Academic Consortium Leadership Development Program. Since 2011, he has served as the Dean of Engineering, the inaugural holder of the Clay N. Hixson Chair for Engineering Leadership, and Professor of Mechanical Engineering at Tennessee Technological University.

In the course of his career, Dr. Rencis' principal research interests have been in boundary elements, finite elements, mechanics of materials, multiscale modeling, and engineering education. He has published over 35 journal articles, and over 110 conference articles. Dr. Rencis is active in various professional organizations at the local and national levels. Among these are ASME and ASEE. Currently he is the 2015-2016 ASEE President. He is a registered professional engineer in Massachusetts.



**Bud Fischer** is a native of Buffalo, New York. He received his BS in forest ecology from the State University of New York College of Environmental Science and Forestry School at Syracuse, his MS in Biology from the State University of New York College at Buffalo and his

PhD in Ecology from the University of South Carolina. After completing his degrees, Dr. Fischer worked nine years for the University of Georgia's Savannah River Ecology Laboratory as the research coordinator for the physiological ecology laboratory. Dr. Fischer then spent 15 years at Eastern Illinois University where he was professor of biology and associate chair of the Department of Biological Sciences. Prior to being named Dean of

the College of Basic and Applied Sciences at MTSU, he spent 4 years as chair of the Biology Department at the University of Alabama at Birmingham. Dr. Fischer's expertise is in aquatic ecology, fisheries biology, stream ecology and evolutionary biology, and his research has focused on the following two specific areas: 1) examining changes in morphology, physiology, behavior and life-history traits of bluegills and other aquatic organisms in response to environmental perturbation, 2) determining the effects of land-use practices on stream ecosystems. Dr. Fischer has made more than 100 professional presentations, published over 45 peer-reviewed articles, obtained 60 grants totaling more than \$2 million and has mentored 38 graduate students to completion during his academic career.

# TLSAMP LEADERSHIP TEAM



Penn State, and a PhD in Mining Engineering, also from Penn State. He began his academic career in the Mining Engineering Department at Southern Illinois University. Prior to coming to Memphis, he spent the previous 25 years at the University of Kentucky

**Richard J. Sweigard** began his tenure as Dean of the Herff College of Engineering at the University of Memphis on June 1, 2013. He is a native of Pennsylvania and holds a B Sdegree in Civil Engineering from Drexel University, an M.S. degree in Geology from

where he performed research aimed at minimizing the environmental impacts of mining. He started there as an Associate Professor of Mining Engineering, served as Chair of Mining Engineering for 14 years and spent the last six years as Associate Dean for Administration and Academic Affairs. In his current role as Dean, he has increased undergraduate enrollment through a targeted recruiting strategy and increased funding for engineering scholarships. He is a member of the Executive Committee of the Engineering Accreditation Commission of ABET and has also served as a member of the Committee on Earth Resources of the National Research Council. He is a licensed professional engineer in Pennsylvania and Kentucky.



has served as a professor of mechanical engineering with

**Masood Parang, PE** is Associate Dean for Academic and Student Affairs, College of Engineering, University of Tennessee, Knoxville, Tennessee. Dr. Parang earned his Bachelor's, Master's and Doctorate degrees in Mechanical Engineering from the University of Oklahoma. He

more than 35 years teaching and research experience at the University of Tennessee, Knoxville. His academic expertise is in the area of heat transfer, microgravity fluid flow, two-phase flow and applied math and was awarded NASA faculty fellowships in 1995 and 1996. He served as interim department head of the Mechanical, Aerospace and Biomedical Engineering Department in 2004 and has been the recipient of numerous college and departmental teaching and research awards.



**K. Arthur Overholser, PE** is Senior Associate Dean of the Vanderbilt University School of Engineering and Professor of Biomedical Engineering and Chemical Engineering. After taking his doctorate from the University of Wisconsin, Madison, he was a NATO

Fellow at Imperial College, London, and later a Visiting Scientist at the University of California, San Francisco. With research interests in quantitative cardiovascular physiology, he is a fellow of the American Institute for Medical and Biological Engineering. He is a member of the national Academic Advisory Council of ABET, Inc. He serves as co-PI (Vanderbilt) for the TLSAMP Bridge to the Doctorate Program.

# TLSAMP ACTIVITIES

In 2002, the Tennessee Louis Stokes Alliance for Minority Participation (TLSAMP) grant was funded. This partnership includes the major public minority-serving institutions and the only three Carnegie doctoral-granting institutions in the State. Most importantly, the partners share a strong commitment to increasing access and opportunities for underrepresented minority students in science, technology, engineering and mathematics (STEM). The Alliance was formed to substantially increase the number of underrepresented minorities (e.g., African Americans, Hispanic Americans, and Native Americans) earning STEM degrees, beginning with the bachelors degree and continuing to the masters and the doctorate degrees. Sharing a long-term commitment to work together, TLSAMP has played a significant role in increasing the production of underrepresented STEM professionals to meet the needs of government, industry, and academia.

The TLSAMP is a member of the National Science Foundation (NSF) Louis Stokes Alliance for Minority Participation (LSAMP) community. By complying with the mission of the LSAMP project, the goal of the TLSAMP is to significantly increase the quality and quantity of baccalaureate degrees awarded to underrepresented STEM students who continue to graduate school. The specific objectives for achieving the goal of the alliance are to:

- Improve the recruitment of underrepresented students into STEM majors at TLSAMP universities, especially those students transferring from community colleges
- Improve the retention and persistence of underrepresented STEM majors across the Alliance
- Ensure that a large number of undergraduate students are prepared to enter graduate programs

A strong academic support structure and fabric is woven into the TLSAMP program which increases the expected successfulness of the STEM student. Program coordinators conduct ongoing coordination and communication between academic units.

**Recruitment:** TLSAMP actively engaged in on-going recruitment efforts. These efforts ranged from institutionally planned recruitment to program initiated recruitment. Recruitment to retention activities were largely institution-specific and included internal and external strategies that operated at the institution and program levels. These activities include:

- a. Coordination with the routine recruitment activities institutions undertook via inclusion of TLSAMP materials in university-organized recruitment events,
- b. Targeted recruitment of STEM freshmen coupled with changes to financial aid dispensation,
- c. Targeted connection and engagement with current students who declared or converted to STEM majors,
- d. Connection and affiliations with other campus and community-based programs that had compatible goals/objectives and/or target groups,

# TLSAMP ACTIVITIES

- e. Expanded outreach into the local communities via hosting pre-college outreach and enrichment activities that exposed high school students to the institution, and
- f. Expanded recruitment activities with state community colleges, especially at Nashville State Community College and Southwest Tennessee Community College.

**Retention:** The TLSAMP program is involved in a variety of retention efforts across the Alliance. Most institutions participate in some form of the following retention activities:

- **Summer Bridge** allows students to transition from high school to college easily. Mathematics, science, programming, language, and communication skills are enhanced during the summer. Most Summer Bridge programs have been institutionalized across the Alliance.
- **Peer mentoring** includes upper class students, peer mentors, who serve as a resource, a helping hand, a sounding board, and a referral service for freshman and sophomore students. Peer mentors provide support, encouragement, and information to lower class STEM students who are in the beginning stage of their undergraduate program.
- **Research** for juniors and seniors and high performing sophomores allow students to work with faculty on on-going research projects at the alliance institutions. Students identify the faculty advisor and ask to be a part of the faculty's research. The faculty serves as a mentor for the student, providing them with technical research skills and preparing and motivating them to pursue graduate studies in STEM related fields.
- **Tutorial Services** are tutorial programs that are coordinated each semester to assist students with academic difficulties. Most tutorial programs have been institutionalized across the Alliance.
- **Seminars/Workshops** are typically monthly meetings where information about academic, scientific, professional or technical information is provided. Seminar topics include Professional Development, Time Management, Internships, Entrepreneurship, Career Development, Academic Success and Graduate Studies, and etc.
- **Curriculum Reform** is a vital component of any retention program. The undergraduate curriculum is reviewed periodically to ensure that the students are exposed to the latest technologies and educational resources.
- **Gatekeeping Strategies** are implemented across the Alliance. Retention of STEM students in courses that are roadblocks is essential for the success of TLSAMP. Strategies are developed and implemented to ensure the student's success.
- **Supplemental Instructions** are given in some classes. Academic support offering free regularly scheduled study sessions make it easier for students to transition out of selected difficult courses.

# TLSAMP ACTIVITIES

**Graduate School Transitions:** One of our objectives is to ensure that more students attend graduate school. The following activities are implemented to make it easier for undergraduate students to transition into graduate programs.

- **Faculty Mentoring** encourages faculty members to mentor at least one student through research. Our intent is to ensure that undergraduate students are involved in all research projects that are conducted by the faculty. Students' participation in undergraduate research increase their chances of attending graduate school.
- **GRE Prep Workshops** are coordinated on individual campuses. The workshops cover GRE test taking strategies, study skills, and problem concepts. The goals of this initiative are to provide participants with study material, provide GRE preparation and practice, and assist with applying to graduate school.
- **Scientific and Professional Conferences** are vital and necessary activities for research endeavors. Faculty and students successes are measured by the quantity and quality of their research accomplishments.
- **Interactions with AGEP** and other NSF programs lays the foundation for adequately preparing our students for entrance into graduate school. Our students are exposed to faculty and research opportunities at doctoral granting institutions.

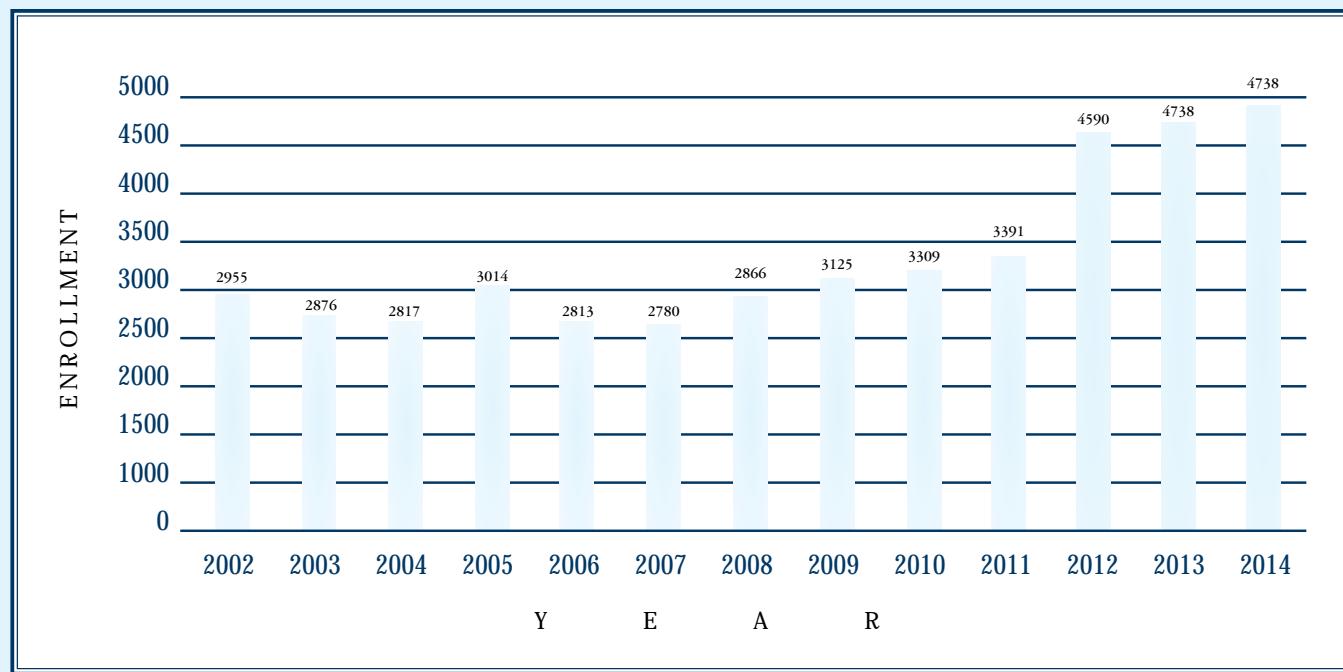
All institutions participate in the following two Alliance-wide programs. These collaborative efforts make it easier for facilitation across the entire Alliance.

- **TLSAMP Annual Research Conference**  
LSAMP convenes an annual research conference each year that is hosted on a rotational basis throughout the Alliance. Undergraduate student researchers engage in oral and poster presentations. Additionally, a graduate school fair is hosted to enlighten undergraduates with opportunities to continue their education and encourage enrollment into graduate school.
- **TLSAMP International Research Program**  
Alliance STEM faculty members submit proposals to lead an international research experience. The experience must last for at least four weeks and must involve TLSAMP students conducting research at foreign sites with appropriate foreign expert mentorship. The research experience enables students to work within an established collaboration between the awardee of the proposal and a foreign collaborating research group.

# ENROLLMENT & DEGREE PRODUCTIVITY

The Tennessee Louis Stokes Alliance for Minority Participation (TLSAMP) program began in 2002 with a combined enrollment of 2955 underrepresented minority science, technology, engineering and mathematics (STEM) students. The fall 2014 enrollment was 4787. This represents a 62% increase. Some of this growth is due to the increase of additional institutions. TLSAMP continues to sustain the goal of NSF by making a concerted effort in the recruitment of underrepresented STEM students.

## ENROLLMENT



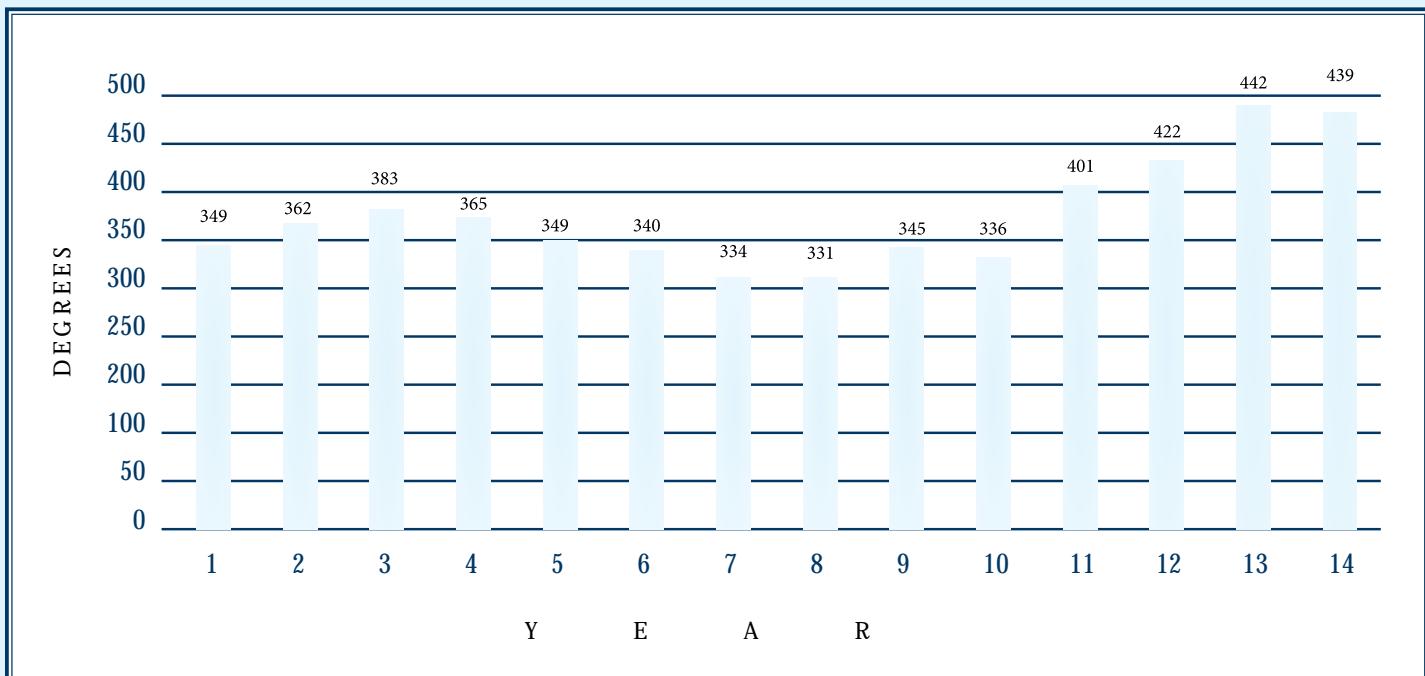
The degree productivity across the Alliance has increased by 26% since 2002. Just like the enrollment increase, part of this increase is due to the increase of institutions associated with the Alliance. However, the overall number of degrees awarded increased by about 20% from 2011 to 2012, the last year before the additional schools were added to the Alliance. As the enrollment continues to increase, the degree productivity will also continue to rise. The Alliance continues to be a window of opportunity for underrepresented minority STEM students. The alliance has awarded 5,198 minority undergraduate STEM degrees since inception. More than 700 of these students have continued into graduate programs immediately after graduation. Many more graduates enrolled in graduate programs after working or participating in other endeavors.

# ENROLLMENT & DEGREE PRODUCTIVITY



# ENROLLMENT & DEGREE PRODUCTIVITY

## DEGREES



TLSAMP Level I Student Degree Tracking				
Year	Level I Students	% Graduated	% Persisted	% Graduate School
2002-2003	87	63%	63%	31%
2003-2004	365	70%	78%	43%
2004-2005	448	69%	79%	41%
2005-2006	498	70%	80%	45%
2006-2007	478	73%	82%	53%
2007-2008	570	66%	76%	47%
2008-2009	566	59%	74%	46%
2009-2010	414	53%	80%	46%
2010-2011	313	52%	83%	51%
2011-2012	279	46%	87%	48%
2012-2013	335	31%	90%	34%
2013-2014	294	19%	98%	42%

Level I graduates attend graduate school at a higher rate than the overall STEM students. Since our inception, about 46% of our Level I students have attended graduate school. Additionally, our total graduation rate is approximately 70% while our total persistence, that is, enrollment or degree productivity, is about 80%.

# TLSAMP RESEARCH CONFERENCE

## UNDERGRADUATE RESEARCH CONFERENCE



Annual Research Conference, 2015

The Tennessee Louis Stokes Alliance for Minority Participation (TLSAMP) program hosts an annual Undergraduate Research Conference that rotates among the partnering university campuses. The two-day Research Conference provides TLSAMP students an opportunity to competitively present research findings and allow students to develop successful presentation skills. Also students develop an understanding of professional protocol for attending and presenting at conferences and workshops. Furthermore it presents an environment for students to engage in social networking with other STEM students, faculty, and administrators.

### CONFERENCE PARTICIPATION RATE 2004-2015



# TLSAMP RESEARCH CONFERENCE

## TLSAMP RESEARCH CONFERENCE ATTENDANCE

Host Institution(s)	Year	Conference Theme	Participants
Tennessee State University	2003-2004	<i>"Education and Research: Parallel Paths to Excellence"</i>	112
University of Memphis LeMoyne-Owen College	2004-2005	<i>"Developing the Next Generation of Leaders in STEM"</i>	162
University of Tennessee-Knoxville	2005-2006	<i>"Taking Leadership Steps and Making Progress in Science, Technology, Engineering and Mathematics"</i>	154
Middle Tennessee State University	2006-2007	<i>"Increasing Diversity in Science, Technology, Engineering and Mathematics"</i>	189
Vanderbilt University	2007-2008	<i>"Celebrating Excellence in STEM (Science, Technology, Engineering and Mathematics)"</i>	207
University of Memphis LeMoyne-Owen	2008-2009	<i>"Expanding Horizons in Science, Technology, Engineering, Mathematics-STEM"</i>	201
Tennessee State University	2009-2010	<i>"Pathways to Excellence in STEM"</i>	236
University of Tennessee-Knoxville	2010-2011	<i>"Education and Research: Parallel Paths to Excellence"</i>	270
Middle Tennessee State University	2011-2012	<i>"Tomorrow's Leaders Standing And Meeting the Promise in STEM"</i>	279
LeMoyne-Owen College	2012-2013	<i>"Celebrating 10 Years of Excellence in STEM"</i>	178
Vanderbilt University	2013-2014	<i>Education &amp; Research: Parallel Paths to Success</i>	300
Tennessee State University	2014-2015	<i>"Gateways to Graduate Excellence in Science, Technology, Engineering and Mathematics"</i>	238

Since 2002 the conference has been attended by more than 2500 participants. Across the Alliance, there is support and opportunities provided for students to participate in research activities. These included hands-on research, shadowing, research methods courses, hands-on conference attendance and presentations. The Alliance's signature event is the Annual TLSAMP Undergraduate Research Conference, the purpose of which is to foster and promote research initiatives within the Alliance.



**Annual Research Conference  
2015**

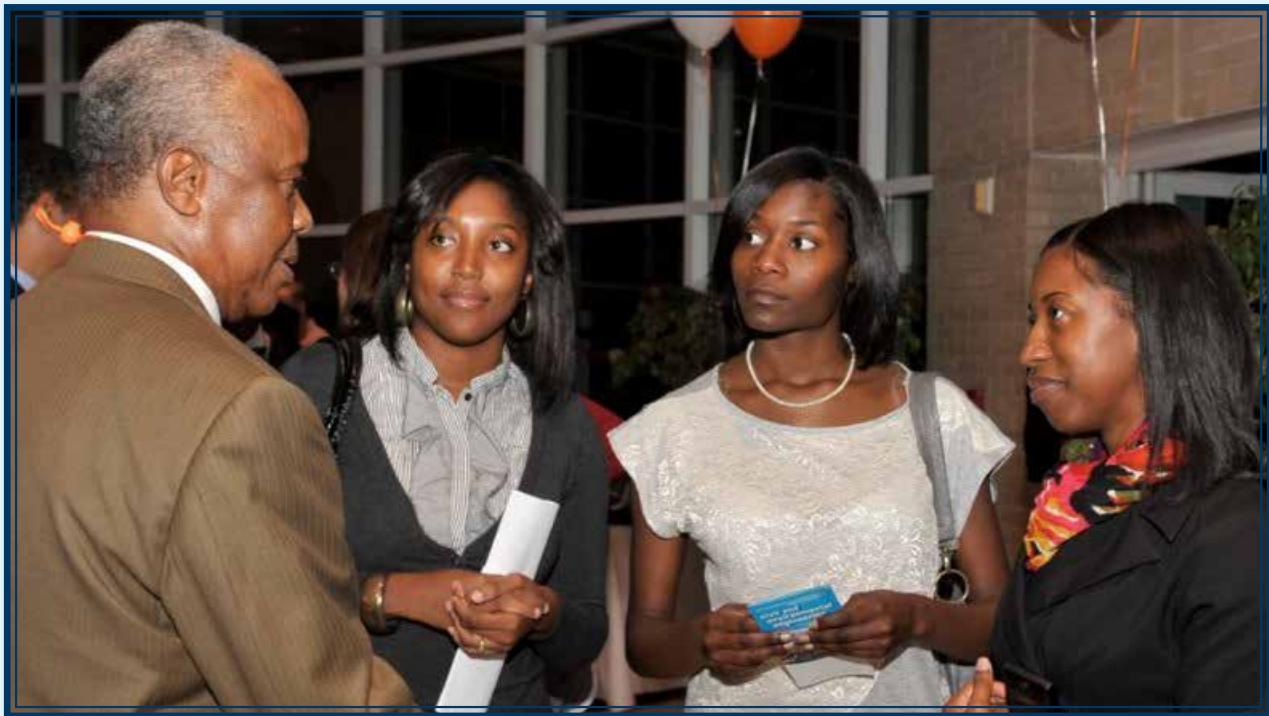
# TLSAMP RESEARCH CONFERENCE



# TLSAMP RESEARCH CONFERENCE



**Dr. Lonnie Sharpe with various TLSAMP Award Recipients  
at the 2015 Annual Research Conference**



**TLSAMP students interacting with Dr. A. James Hicks  
at the 2011 Annual Research Conference**

# INSTITUTIONALIZATION



**2014 Intercollegiate Summer Bridge students attending Denso Engineering Field Trip at UTK**

Institutionalization of program and activities is required by NSF for our TLSAMP grant. The intent is to ensure that program elements continue after NSF funds have ceased. Each institution has institutionalized many facets of our programmatic activities. Office space has been allocated at all TLSAMP institutions and many staff positions are fully or partially covered by institutional funds. Tutorial services and bridge programs have been institutionalized.

**Office Space** – Each institution has designated office space for a TLSAMP Office. Throughout the Alliance, TLSAMP has acquired over 11,480 square feet of office space for operating the program.

**Staff** – Financial support for TLSAMP coordinators and facilitators have been incorporated into the institutional budgets throughout the Alliance. These programs could not operate with the full support of administrative units at each institution.

**Tutorial Services** – All institutions provide tutorial services to students. Many services are geared toward improving the retention rates of freshman and sophomore level students. At TSU, a Science and Math Tutorial STEM Center has been institutionalized.

**Summer Bridge Programs** – TLSAMP has transitioned from the alliance wide TLSAMP Summer Bridge Programs to individual institutions offering summer bridge program for each institution. Institutions continue to provide incoming STEM freshman summer bridge opportunities to gain first hand exposure to the typical university academic, cultural, and social environments. Through participation in these programs, STEM students are exposed to academic concepts in mathematics, science, and language arts; and participate in hands-on science and engineering experiments. In addition, career and personal development skills are addressed in order to enhance the students all around college preparation. Students attending the Summer Bridge program receive instruction and information to give them a jumpstart on academic success for their upcoming year in college.

# INSTITUTIONAL HIGHLIGHTS

## LEMOYNE-OWEN COLLEGE



LOC TLSAMP participant Amber M. Johnson graduated from LeMoyne-Owen College in 2011 with a Bachelor of Science degree in Computer Science. She was an LSAMP fellow in the Bridge to the Doctorate program at Jackson State University where she received her Master of Science Degree in 2013. Johnson is currently pursuing her PhD at Purdue University in Computer Science focusing on "Vehicle-to-Vehicle Security Feature Analysis" under the direction of Dr. Bharat Bhargava. Johnson stated that "TLSAMP/LSMAMP has provided the mentorship, support, and most of all opportunity for me to achieve my goals as well as challenge my potential."

## TENNESSEE STATE UNIVERSITY

TSU TLSAMP participant Catherine Armwood graduated from Tennessee State University in 2007 with a Bachelor of Science degree in Architectural Engineering. Academically, she obtained several accolades and was inducted into Alpha Kappa Mu Honor Society, The Golden Key International Honor Society, and Phi Alpha Epsilon Honor Society. Upon completion of her undergraduate degree, she went on to obtain a PhD degree in Architectural Engineering from the University of Nebraska Lincoln in 2014.

Dr. Armwood is now a tenure track Assistant Professor at Tennessee State University in the Civil and Architectural Engineering Department. Her research interests include the study of structural material properties and behavior, non-destructive testing, and structural behavior, evaluation, and rehabilitation.



# INSTITUTIONAL HIGHLIGHTS

## SOUTHWEST TENNESSEE COMMUNITY COLLEGE

On Thursday - September 11, 2014, with officials from the two institutions watching, Tennessee State University and Southwest Tennessee Community College signed an agreement that allows students who complete two years at SWTCC to transfer to TSU to complete their baccalaureate degree. TSU President Glenda Glover and SWTCC President Nathan Essex signed the Transfer Partnership Agreement during a ceremony on the SWTCC campus in Memphis.



## UNIVERSITY OF TENNESSEE - KNOXVILLE



The Colleges of Agricultural Sciences and Natural Resources (CASNR), Arts and Sciences (A&S), and Engineering collaborated in 2014 to host the 1st Intercollegiate Summer Bridge (ISB) program. This bridge program continues to focus on providing a transitional program of study from high school to the university for underrepresented students majoring in Science, Technology, Engineering, and Mathematics (STEM). ISB, based on an established model initiated by the Tennessee Louis Stokes Alliance for Minority Participation (TLSAMP), offered students an overview of chemistry and pre-calculus as well as an introduction to college life. Target participants are underrepresented incoming STEM freshman with ACT Math Scores ranging from 20-25 (CASNR and A&S) and 25-27 for Engineering. The institutionalized program is offered annually supporting 30 incoming freshmen.

# INSTITUTIONAL HIGHLIGHTS

## MIDDLE TENNESSEE STATE UNIVERSITY



The brand-new, state-of-the-art, \$147 million Science Building opened in fall 2014. With more than 250,000 square feet for teaching, faculty and student laboratory research, and collaborative learning, the new building is the biggest improvement ever for science education and research at MTSU and for the more than 13,000 students who enroll annually in biology, chemistry, and other science courses. MTSU's enrollment has almost quadrupled in the last 45 years, but there has been no increase in space for science education until 2014. The original science facilities were built in 1932, and 1967 respectively, and only had a combined space of 117,000 gross square feet.

MTSU TLSAMP participant Tony Lee graduated with a degree in Engineering Technology in May 2012. He is employed at Nissan Manufacturing in Smyrna, Tennessee. In June 2015 he was promoted to Export Warranty Engineer. In this new role, Tony's responsibilities include all Nissan exports including the Infiniti QX60, Nissan Maxima, Nisan Altima, and the Nissan Pathfinder. Tony also traveled to Russia twice in 2013 to assist with Nissan exports. He also serves on the MTSU Engineering Technology Board of Advisors.



# INSTITUTIONAL HIGHLIGHTS

## UNIVERSITY OF MEMPHIS



UM TLSAMP participant Trenton Ensley graduated with a BS degree in Physics and a BS degree in Mathematical Sciences in May 2006. He was awarded a PhD degree from the University of Central Florida where he worked in the College of Optics & Photonics Laboratory (CREOL) in December 2015. The Nonlinear Optics Group conducts research on a variety of nonlinear optical effects, materials, and devices and characterize materials response at picosecond and nanosecond scales. Dr. Ensley is currently a Physicist with the U. S. Army Research Laboratory.



# INSTITUTIONAL HIGHLIGHTS

## VANDERBILT UNIVERSITY

The Engineering and Science building, the first new building devoted to Vanderbilt engineering in fifteen years, will open in August, 2016. It will house multi-disciplinary research groups, most of which are devoted

to application of engineering to medical problems. Designed with input from student focus groups, it will serve as a gathering place and flexible workplace for students and faculty. In addition to meeting space, laboratories, and classrooms, it includes a multi-story Innovation Center. The Innovation Center will foster a “maker culture” to support a mission of ingenuity and entrepreneurship and will bring together students and professors from all over the campus.



VU TLSAMP participant Jessica Deloris Haley earned a PhD in Chemical and Biomolecular Engineering from Vanderbilt University with a focus on Molecular Modeling and Simulations. Her PhD dissertation title was *Towards an Improved Statistical Associating Fluid Theory (SAFT) for Predicting the Thermodynamic Properties of Complex Molecular Systems for Environmental Applications*. She is a 2010 graduate of Vanderbilt University. Jessica earned her Bachelors in Chemical and Biomolecular Engineering and a Masters of Science in Environmental Engineering, completing both degrees in just 4 years. She was a member of the NFL cheerleading team for the Tennessee Titans from 2011-2014, ranking as #3 in the top 100 NFL cheerleaders. Through her work with the Titans she has engaged in numerous nonprofit, community service work. Jessica also served as tutor coordinator for TLSAMP. Currently, Dr. Haley is employed as a Senior Research Engineer with ExxonMobil.



# INTERNATIONAL RESEARCH

The Tennessee Louis Stokes Alliance for Minority Participation (TLSAMP) program now request proposals from partner universities to support international research experiences. Projects must involve TLSAMP students conducting research at foreign sites with appropriate foreign expert mentorship. The principal investigator (PI) is responsible for all facets of the research experience, including the specific research topics, foreign site placements, appropriate foreign research mentorship, and all necessary local resources. The PI is also responsible for recruiting and preparing the students to participate in these experiences. The research experience enables students to work within an established collaboration between the PI and a foreign collaborating research group.

The research experience must include at least three Level I TLSAMP students across the Alliance and at least one student must come from outside the PI's institution. The experience must have duration of at least four weeks of summer research conducted abroad. Support must be given to students who are U.S. citizens; the intent of the program is to broaden the international experience of U.S. students.

The first international summer research experience was held during the summer 2015. Three students participated in a 4-week summer research experience trip to Sichuan University in Southwest China. Activities at the host University include conducting laboratory research and interacting with local faculty and students during week days and visiting historical and natural sites near the city during weekends.



**Students get involved with Chinese culture**



**TLSAMP students in Southwest China**



**TLSAMP students and research team at Sichuan University**

# TENNESSEE PROMISE



Tennessee is being recognized for its commitment to increasing access to public higher education and preparing its workforce for the challenges of tomorrow. In 2013, Tennessee Governor Haslam launched his Drive to 55 Initiative, an initiative aimed at increasing the amount Tennesseans with a college degree or certificate to 55 percent by 2025. Furthermore, this has been achieved without a tax increase.

Tennessee Promise is a part of Drive to 55 Initiative. It is both a scholarship and mentoring program focused on increasing the

number of students that attend college in the state of Tennessee. The Tennessee Promise provides free tuition for qualified students. It provides students a last-dollar scholarship, meaning the scholarship will cover tuition and fees not covered by the Pell grant, the HOPE scholarship, or state student assistance funds. Students may use the scholarship at any of the state's 13 community colleges, 27 colleges of applied technology, or other eligible institution offering an associate's degree program. In addition, Tennessee Promise participants must complete eight hours of community service per term enrolled, as well as maintain satisfactory academic progress (2.0 GPA) at their institution.

Data taken from the first year of the TN Promise reports that there were 16,291 students enrolled, of which 85% enrolled at community colleges or two year programs. Enrolled students had an average ACT score of 19.1 and an average high school GPA of 3.05. With financial aid, 53% of the students were Pell eligible, 34% were full Pell eligible, 45% had Pell cover tuition and fees and 58% were Tennessee Education Lottery Scholarship eligible. The net cost of the TN Promise for 2015-2016 is \$10.6 million which provided an average TN Promise award per student of \$1,020.

The overall enrollment increased 10% in the first year in Tennessee public higher education. Changes in First-time Freshmen (FTF) enrollment resulted in a 20% increase at community colleges and there was an increase in the average ACT score of FTF at four-year institutions.

# ECONOMIC IMPACT

STEM workers drive our nation's innovation and competitiveness by generating innovative ideas, new companies and new industries. In accordance with the July 2011 reporting by the U.S. Department of Commerce, Economics, and Statistics Administration, the impact that STEM degrees have on the nation's economy is tremendous. For example,

- In 2010, there were 7.6 million STEM workers in the United States, representing about 1 in 18 workers.
- STEM occupations are projected to grow by 17.0 percent from 2008 to 2018, compared to 9.8 percent growth for non-STEM occupations.
- STEM workers command higher wages, earning 26 percent more than their non- STEM counterparts.
- More than two-thirds of STEM workers have at least a college degree, compared to less than one-third of non-STEM workers.
- STEM degree holders enjoy higher earnings, regardless of whether they work in STEM or non-STEM occupations.

Our Alliance continues to produce graduates that are an integral component of this workforce. The impact of these graduates is remarkable.

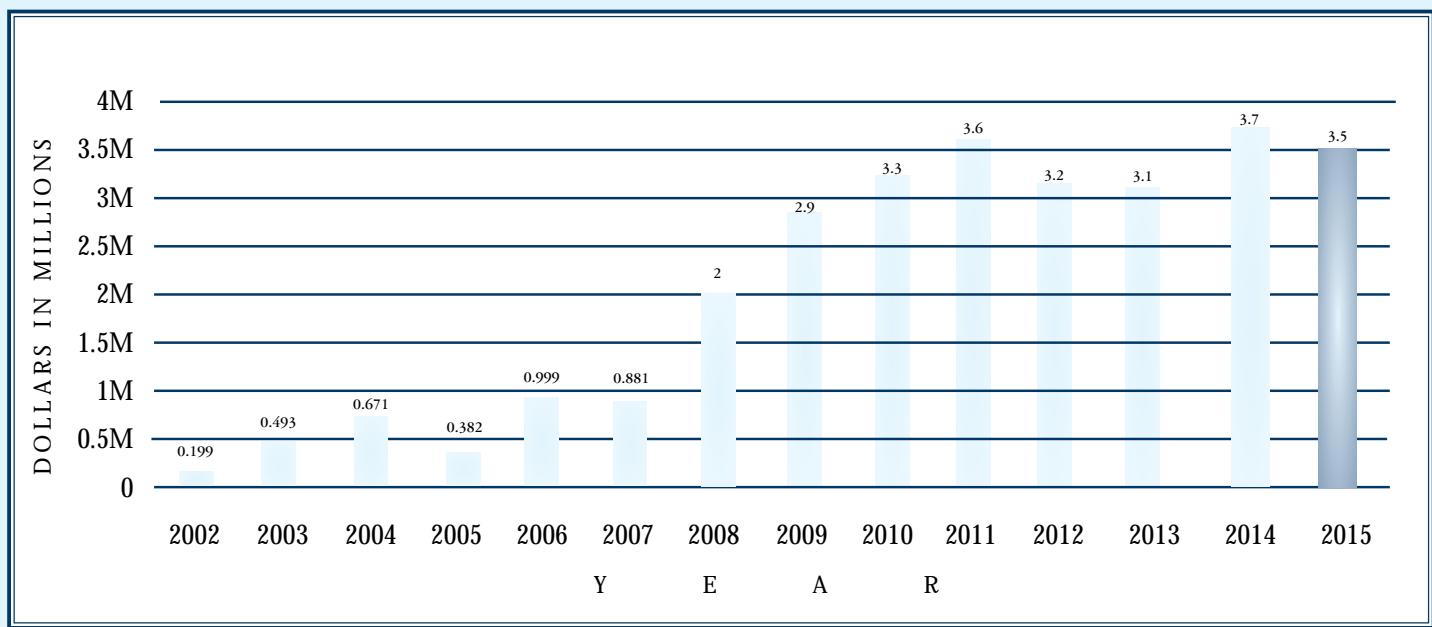


# ECONOMIC IMPACT

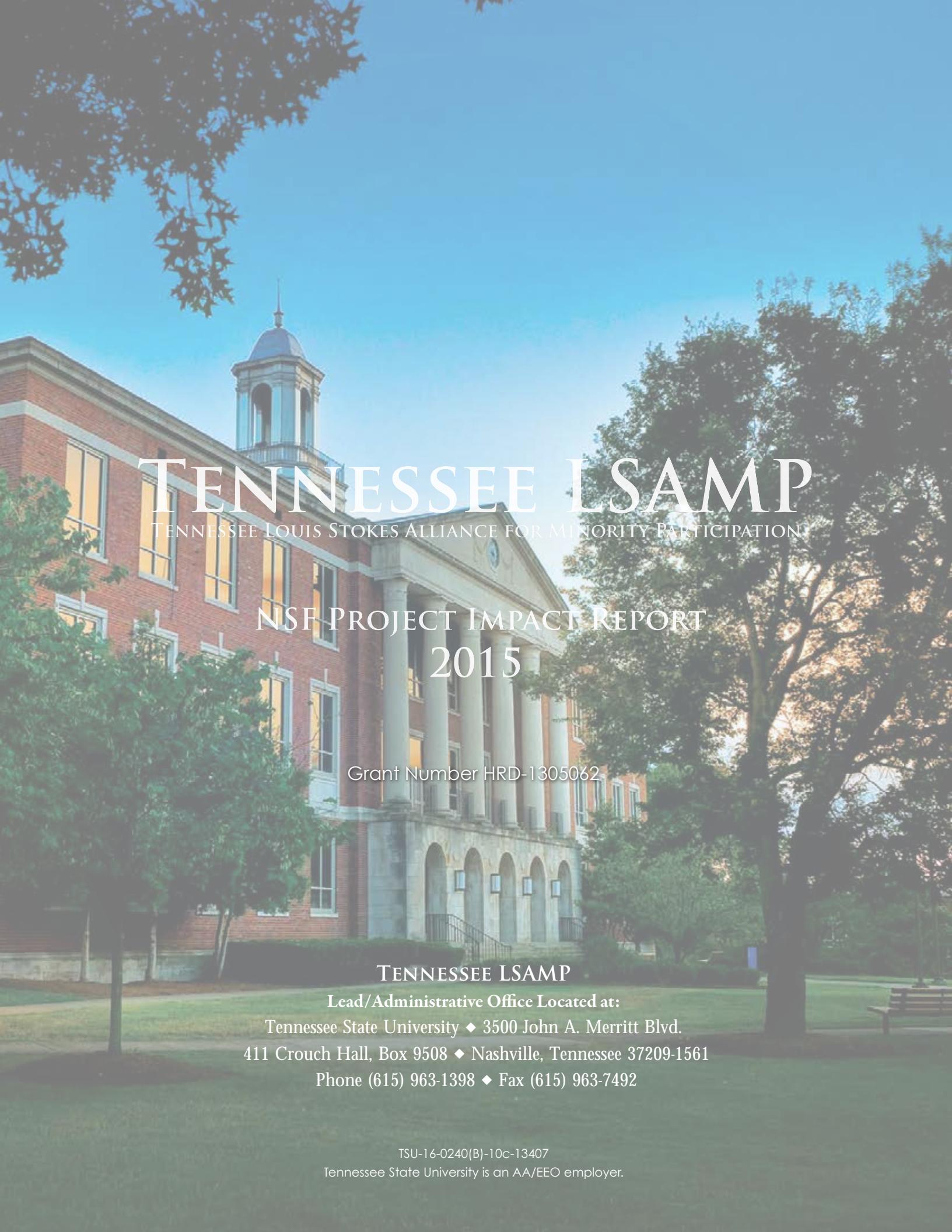
TLSAMP is described as the single best collaboration among institutions across the state of Tennessee. TLSAMP is truly making a difference in the lives of many citizens across the state. TLSAMP has made a tremendous impact on underrepresented undergraduate STEM education. Since our inception in 2002, TLSAMP has graduated approximately 5200 minority students with bachelor's degrees in the STEM disciplines.

Since 2002, TLSAMP institutions have received approximately \$30 million through leveraging and partnerships. Many of these funds have been used to support undergraduate research opportunities. Some have been used to support middle and high school initiatives.

## FUNDS LEVERAGED



The impact from our graduates has been overwhelming. For the 2014-2015 school year, the average starting salaries for STEM undergraduate students across the Alliance was \$51,304. If the assumption is made that the average salary for all of these minority STEM students was about \$50,000, then these graduates would have earned over \$1.75 billion during the period of performance of the TLSAMP grant.



# TENNESSEE LSAMP

TENNESSEE LOUIS STOKES ALLIANCE FOR MINORITY PARTICIPATION

## NSF PROJECT IMPACT REPORT 2015

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TENNESSEE LSAMP

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