

VISION 2020



Changing the World

Civil, Architectural and Environmental Engineering

MISSOURI UNIVERSITY OF SCIENCE AND TECHNOLOGY 

UPDATE
Spring 2015

MISSOURI
S&T

care.mst.edu

Photo by B.A. Rupert



Emily Vandivert
Senior
Architectural Engineering
Maryville, Missouri



Empower

Solar House Team

Building a solar-powered village to promote a sustainable lifestyle.

> Living Sustainably

All solar homes are built and furnished with sustainable products. The tenants of our Solar Village choose to live a sustainable lifestyle.

> Building Intelligently

Solar House Teams design and build each home so that it may regulate its environment using passive solar techniques.

> Generating Renewably

Each house employs solar panels to produce energy for the home as well as a solar thermal system to produce hot water for the floor heating system and for personal domestic use.

2009 Solar House



Solar panels for the 2013 Chameleon House



Over 60 undergraduate team members



solarhouse.mst.edu/





A REPUTATION FOR EXCELLENCE



Long before it became the sophisticated discipline that it is today, civil engineering served as the foundation of ancient societies. Motivated by the need for safety, shelter and mobility, our ancestors laid the framework for our future. In modern civil, architectural, and environmental engineering, meeting

these fundamental needs remains at the forefront of our endeavors. These basic needs have continued to evolve, and now include unprecedented challenges of an increasingly complex global society. Missouri S&T is committed to preparing graduates to meet these challenges. From the first day students step into Butler-Carlton Civil Engineering Hall, they are empowered by state-of-the-art classrooms, world-class laboratory facilities, and dedicated faculty. These future engineers are also energized by outstanding student peer groups that continue to be drawn to S&T because of its reputation for excellence.

Our broad curricula, student organizations, faculty and facilities offer students many outstanding academic and experiential learning opportunities. Specialized areas of study such as advanced infrastructure systems and materials, construction management, geotechnical and water resources engineering, and environmental engineering, health and safety prepare our students to become leaders at the forefront of society's great endeavors — from providing clean drinking water to building tomorrow's advanced infrastructure. In theory and practice — in lab and in real life — Missouri S&T civil, architectural, and

environmental engineering students are preparing to meet current global challenges, and to anticipate those of the future.

If we are to continue graduating outstanding “street ready” engineers and setting the standard for engineering education, we must prepare our graduates to be problem-solvers in a world that is rapidly changing and increasingly diverse and interdisciplinary. The engineers of the 21st century must be skilled in their specialty areas, but they also must be leaders, collaborators, and communicators with a bold and creative mindset. These skills will make our “career-ready” graduates even more valued as they face a lifetime of engineering challenges on “streets” around the world, whether those streets are in the Bolivian Andes, or in modern Dubai, or maybe even on the Moon or Mars.

Our department has embraced a new and exciting vision and, with the input and leadership of our alumni, has developed a strategic plan focused on that future. We have examined our values and strengths, studied the national dialogues, and we have identified areas of opportunity and growth that build upon those strengths. Our strategic plan includes program changes, expanded experiential learning opportunities, improvements in laboratory facilities, and new scholarships and fellowships for the undergraduate and graduate students who will become the leaders and stewards of the future.

— *William P. Schonberg, Ph.D., P.E.*

**Professor and Department Chair
Civil, Architectural and Environmental Engineering**

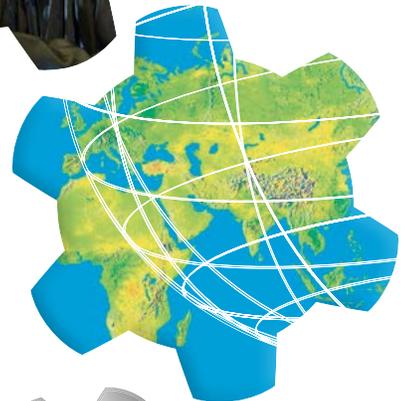
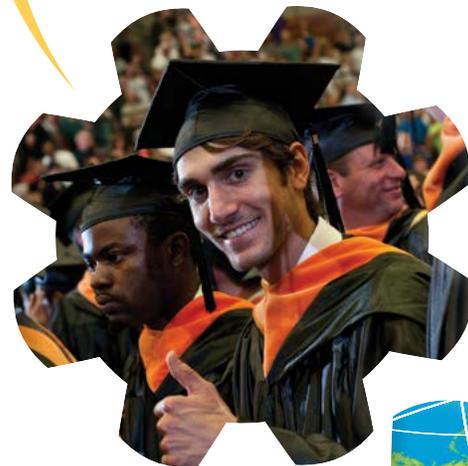


the Mission

We **shape the future** of built and natural environments of our global society through creative research and education.

Civil, Architectural and Environmental Engineering (CArE) at Missouri S&T enjoys an excellent reputation for producing top-notch engineers, and for research that improves the quality of life in our nation and around the world. From highways and bridges to environmental cleanup, to new construction materials, **our graduates make the world a better place.** To meet and exemplify the ideals at the core of this mission, we have developed a strategic plan to advance the department in the following key areas:

- Preparing graduates to **solve technical and engineering challenges** at home and around the world for generations to come.
- Enhancing the **national reputation** of our programs and students among employers, future students and peer institutions so that we are known as “a destination of choice.”
- Engaging in **multi-disciplinary scholarly activities** that foster knowledge creation and technology transfer in targeted areas.





FULFILLING THE MISSION

STRATEGY

We will enhance our strong academic programs and reputation through experiential learning and global experiences. Our efforts will attract and retain the most talented students, staff and faculty to work on the world's most pressing needs. We will generate the knowledge needed to change our world.

THEMES

To fulfill our mission and to position our department on the front line of excellence for decades to come, CARE's strategic plan identifies the following four major themes. These themes integrate with S&T's Campus Strategic Plan Levers.



program innovations & opportunities

1. Enhance our educational programs and delivery methods by offering our students innovative programs and opportunities such as integrated BS + MS programs and required experiential learning activities.

Campus Lever

1.1 Require student experiential learning activity

3.1 Ensure relevant academic program portfolio

3.4 Promote inclusion and increase diversity to remain relevant and competitive in a global environment



program access & degree value

2. Promote the appeal and value of our degree programs to diverse student populations by making admission to our programs more competitive, offering increased scholarship support to students who enroll in new programs (such as our integrated BS + MS program), and establishing competitive fellowships for graduate students.

Campus Lever

2.2 Promote Missouri S&T as Missouri's technological research university

4.5 Transformative doctoral student recruitment



faculty development & collaborations

3. Champion interdisciplinary teaching and research collaborations within the department and across campus by investing in faculty development that supports the department's education and research portfolios in areas of greatest global need.

Campus Lever

1.5 Encourage and enhance collaboration in teaching and research

2.3 Develop culture of excellence in research and creative activity

4.4 Ensure renowned faculty teach and interact with undergraduate students

4.6 Improve student, faculty and staff mentoring and advising



recognition & reputation

4. Nurture knowledge creation, entrepreneurial enterprise and technology transfer to drive transformative change through faculty and student research that demonstrates academic distinction, value to industry, and the promise of breakthrough discoveries in targeted technical areas.

Campus Lever

2.2 Promote Missouri S&T as Missouri's technological research university

2.3 Develop culture of excellence in research and creative activity

3.3 Improve facilities to enhance research and student learning



David Hackney, CE'12
Engineers Without Borders (EWB)
St. Louis, Missouri

program innovations



& opportunities

We believe that our students can meet the greatest of challenges, and that they will change the world.

To **enhance our curriculum and delivery methods**, we will challenge our students with innovative programs and opportunities and require experiential learning activities to broaden their global awareness and enhance their entrepreneurial skillset. These activities will be coordinated within the department, and will prepare our students for careers that will change the world!

Engineers Without Borders (EWB)

Envisioning a world in which all communities have the capacity to meet their basic human needs.

 ewb-mst.org

Trips to: > Guatemala > Bolivia > Honduras



Strategies & Action Items

 **Campus Lever**

› Implement required experiential learning activities in our undergraduate degree programs

Students will be allowed to choose from options that include:

- International experiences such as enrolling in Missouri S&T's Global Minor program, participating in an expanded Engineers Without Borders project or activity, or spending at least one academic semester as part of a Study Abroad program; or
- Internship or co-op experiences that immerse students in engineering practice under practitioner tutelage, with a focus on integrating leadership, entrepreneurial development, professional mentoring, and international vision; or
- Research experiences that allow students to engage with faculty in the pursuit of new knowledge in a key technical area.

1.1
Require student experiential learning activity

3.1
Ensure relevant academic program portfolio

3.4
Promote inclusion and increase diversity to remain relevant and competitive in a global environment

› Develop and implement new educational paradigms

- Integrated BS + MS programs for students who will ultimately pursue professional engineering licensure and/or advanced study. We will offer two choices to our students:
 1. a BS + MEng for those who want to become licensed practitioners
 2. a BS + MSci for those who want to go on to graduate school to pursue a Ph.D.
- Integrated BS + 30 credit hour curricular tracks that are geared toward students interest in pursuing a non-engineering career (e.g. business, law, medicine, etc.)
- Enhance and expand online and blended course offerings to reach an ever-growing population of non-traditional students.

Task List

➔ **Identify and maintain funding streams** to provide student support for international programs, as well as scholarships for students enrolled in our integrated BS + MS programs throughout the full length of these programs. One possibility is the addition of a small student fee that would come back to the department to support these student programs and activities.

➔ **Identify and secure alumni partners and industrial collaborations** particularly for the annual placement of more than 100 students in internships and co-ops. Mechanisms for evaluating professional development and tracking/engaging companies will need to be established to ensure that all students receive similar development challenges and opportunities.

➔ **Hire a full-time staff member** such as an Experiential Activities Coordinator, to facilitate identifying appropriate co-op and internship opportunities, manage agreements with partner companies, place students and assess their progress and activities.

➔ **Develop a funding mechanism** by engaging industry partners to support staff and programs related to student experiential learning initiatives and to ensure that we are meeting the needs of our profession.

› Promote these opportunities and related student successes to attract students that will flourish in these kinds of environments throughout their careers



EWB travels to Nahualate, Guatemala in August 2012.

program access & degree value



Charles Beauvais



Wesley Hackett



Melissa Buechlein

To **promote the appeal and value of our degree programs to diverse student populations**, we will make admission to our programs more attractive and competitive, offer increased scholarship support to students who enroll in new programs (such as our integrated BS + MS program), and establish competitive fellowships for graduate students.



futurestudents.mst.edu

Strategies & Action Items

Undergraduate Students

› Scholarship Program

We will restructure our scholarship program so that we are able to provide enhanced levels of support to students enrolled in our integrated BS + MS through the conclusion of their studies. This increased scholarship support will accentuate both the status of the program and the exemplary scholarly achievements of our students. We will also use existing and future scholarships to recognize and encourage students who have demonstrated a commitment to “changing our world” through their accomplishments and actions outside the classroom.

› Entrance Requirements

We will manage enrollments in our three undergraduate programs using academic entrance requirements other than simply exceeding a minimum GPA value. These requirements will be publicized so that students enrolled in the Missouri S&T Freshman Engineering Program understand the competitive academic record they need to acquire before enrolling in our programs.

Graduate Students

› Department Fellows

We will create a cohort of new graduate students, called Department Fellows, who will spend some semesters rotating among labs before choosing an advisor and a specific research topic.

- These students will demonstrate interests in broad areas or flexibility in their career plans when they matriculate at Missouri S&T.
- These students will be recruited through a competitive process, including a campus visit, a seminar presentation, etc.

› Teaching Assistantships

We will shift graduate teaching assistantships to support an increasing number of outstanding Ph.D. students and a fewer number of M.S. students. In recruiting our Ph.D. students, we will emphasize the higher quality of life in Rolla, the lower cost of living and the value of an S&T degree.



Our creative students and successful alumni are at the heart of our reputation as a leading institution for higher learning in civil, architectural and environmental engineering.

Sara Tabatabaei
Ph.D. Student
Civil Engineering
Qom, Iran

Photo by Stacey Marler

Changing the world

Task List

- ➔ **Develop and implement a plan to ensure that appropriate levels of laboratory and grading assistance are available to faculty under the new graduate teaching assistantship paradigm.** Some possibilities include:
 - requiring Ph.D. students to enroll in a course that has service as a teaching assistant as its primary course activity
 - requiring Ph.D. students to enroll in the department's "Teaching Engineering" course, which would be modified to include a lab component consisting of a semester-long teaching assistant assignment
 - developing a "practicum course" for graduate students, which would include service as a teaching assistant as a course assignment

- ➔ **Identify and maintain funding streams** to provide scholarships for students enrolled in our integrated BS + MS programs throughout the full length of those programs.



Campus Lever

2.2

Promote Missouri S&T as Missouri's technological research university

4.5

Transformative doctoral student recruitment



GRADUATE STUDENT FELLOWSHIP PROGRAM

A department's graduate program is the incubator for the leadership and scholarship of tomorrow. No academic department can grow in size and stature without recruiting and retaining outstanding graduate students. The contributions of these emerging scholars play a vital role in advancing the department's reputation among its national and global peers. Their work on the frontiers of the future defines the department's legacy for years to come.

In response to this priority identified in our strategic plan, we have launched a Graduate Student Fellowship Program to increase the funding available to those pursuing graduate work in our department. This program will help us attract top talent. In turn, these Fellows will enrich our department, and the entire academic community, in a multitude of ways: through their research and connections with industry partners and peer institutions, through their role as mentors to and collaborators with undergraduates — and, ultimately, through their distinguished careers as Miner alumni.

Over the past few years, thanks to generous donors who have already invested in our graduate program, the Civil, Architectural and Environmental Engineering Department has established several small graduate fellowships in a few select disciplines. Now, in order to expand the Graduate Student Fellowship Program, we are seeking endowment funding for additional fellowships in a variety of disciplines.

By providing stipends that cover living expenses, as well as tuition and fees, these graduate fellowships will be key to the recruitment and retention of outstanding graduate students.

There is no better way to fulfill our department's mission of preparing "street-ready" engineers than by creating an academic environment conducive to experiential learning, collaboration and application. The Graduate Student Fellowship Program is integral to achieving this vision — and fundamental to our future among the best civil, architectural and environmental engineering programs in the nation.



Mahdi Arezoumandi works to improve bridge safety by using a stronger, more environmentally friendly concrete.





“Building upon Missouri S&T’s long- standing foundation of excellent undergraduate education, SCI Engineering Inc. and collaborating alumni firms sought to enhance the department’s graduate programs and raise them to the same level of excellence and expectation at a national level.

By providing stipends to cover living expenses as well as tuition and fees, graduate fellowships will facilitate the recruitment of outstanding graduate students that will propel the department’s graduate programs to the level of excellence expected from S&T. Investing in graduate programs significantly strengthens the

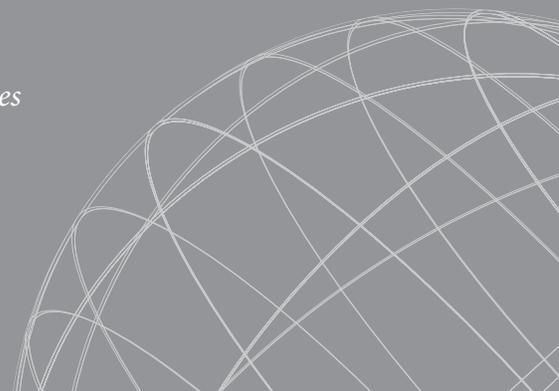
educational experience for all students, as graduate students endeavor to learn and solve problems by working directly with S&T faculty who allow strategic insight into their intellect.

S&T has an excellent reputation for graduating ‘street-ready’ engineers at the undergraduate level. By providing graduate fellowships, we are encouraging undergraduates to continue their education as they take their next steps to becoming ‘career-ready’ engineers in workplaces that increasingly stress higher levels of scientific and technological expertise.”

— Mark Harms



Mark Harms
CE’83, MS CE’85
St. Louis, Missouri



We believe that we are part of the solution to the world's greatest challenges.



faculty development & collaborations

To **promote interdisciplinary teaching and research collaborations** within the department and across campus, we will invest in faculty development to support the department's education and research portfolios. This includes funding a Professor of the Practice position as well as recognizing promising junior faculty through a targeted number of early- and mid-career endowed faculty positions.



Pictured from left to right: Ph.D. students Grace Harper and Matt Limmer, with Professors Dr. Eric Showalter and Dr. Joel Burken.



Dr. Ronaldo Luna, along with a group of engineers from EERI, World Bank and AGIES, visited some of the areas affected by the 2012 M7.4 Guatemala earthquake.

Task List



- ➔ **Identify and maintain funding streams** to support new faculty hires, innovation start-up packages, entrepreneurship and faculty development awards.
- ➔ **Work with the university administration to help ensure the success of future non-traditional faculty we hire** (such as practitioners, biologists, or social scientists) to fulfill our mission of preparing students to meet new technological challenges around the world.

Strategies & Action Items

› Professor of the Practice

A new departmental position will be created for a Professor of the Practice who is well-connected with regional and national companies and who can advance the department's experiential learning initiatives. (see next page)

› Faculty Excellence Awards

We will develop current and new faculty by providing growth opportunities through Early-Career and Mid-Career Faculty Development Awards. These awards will be for a fixed duration and will mirror more traditional endowed faculty appointments, but at a lower level. These appointments will also strengthen the retention of "rising star" faculty in the department and provide valuable research support to allow them to pursue their most innovative, entrepreneurial ideas. (see page 18)

› Recruit and Engage Top Scholars

We will focus our hiring efforts on high performers who can fill our most critical needs. To increase our applicant pools, a seminar series featuring potential faculty recruits and intercampus collaborations will be initiated. Faculty will host speakers and seek collaborations as we continually strive to be innovators and entrepreneurs.



Campus Level

1.5

Encourage and enhance collaboration in teaching and research

2.3

Develop culture of excellence in research and creative activity

4.4

Ensure renowned faculty teach and interact with undergraduate students

4.6

Improve student, faculty and staff mentoring and advising

Planting Green

More than 50 students, faculty members and community volunteers worked together to help plant the new green roof atop Emerson Hall.

› **Heading the Project:** Grace Harper, master's student and Chancellor's Fellow, environmental engineering

› **Donated Goods:** Helene Hardy Pierce, S&T Trustee, GAF Materials Corporation



› **Video:** View the time lapsed planting at care.mst.edu/facilities/greenroof

Dr. Glenn Morrison
Associate Professor
Environmental Engineering



Charles Beauvais, EnvE'12
Kansas City, Missouri



Mentor

Photo by B.A. Rupert

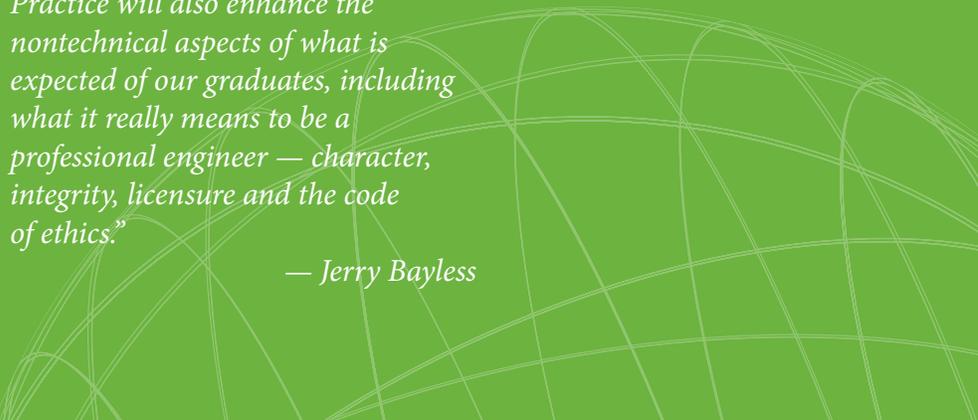


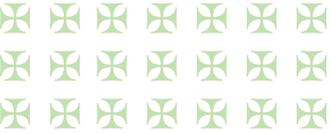
“The Professor of the Practice position is a key to enabling the Department to continue and enhance its ability to produce graduates who are ‘street ready’ engineers. In addition to connecting the basic concepts covered in lecture classes with the application of those concepts to problems encountered in the practice of engineering, the Professor of the Practice will also enhance the nontechnical aspects of what is expected of our graduates, including what it really means to be a professional engineer — character, integrity, licensure and the code of ethics.”



Jerry Bayless
Associate Professor
Civil Engineering

— Jerry Bayless





PROFESSOR OF THE PRACTICE

Graduating students should understand the profession and practice of engineering. Building on our tradition and existing strengths is our department's top priority, and the creation of the Professor of the Practice will provide our students with a much-needed mentor in the area of professional engineering practice.

The Professor of the Practice faculty appointment will be made only to a professional who has attained a high level of expertise and prominence in one or more areas of engineering practice and who can bring that technical experience from industry to the department. The Professor will be well-connected with regional and national companies and will build partnerships to benefit the work of Missouri S&T.

The Professor of the Practice is expected to mentor students on a wide range of challenging issues and to ensure that the business and practice of engineering is integrated into our educational programs. An important component will be for the Professor to advance the department's experiential learning programs, including internships, cooperative education and Engineers Without Borders. Most importantly, the Professor of the Practice will mentor students in the application of engineering in day-to-day practice. The cost to fund this position is \$150,000 per year; to fully endow it requires \$3M.



A teacher affects eternity;
he can never tell where his
influence stops.

— *Henry Brooks Adams (1838-1918)*



Pictured from left to right: Ph.D. student Yang Yang, Dr. Lesley Sneed and Dr. M. Saiid Saiidi, a visiting scholar from University of Nevada, Reno.



We believe in inspiration, innovation and creativity.



recognition & reputation



Photo by B.A. Rupert



Pictured from left to right: Jason Cox, Chenglin Wu, Ying Huang, Dr. Genda Chen, Gary Abbott, Brian Swift and Mostafa Fakharifar.

To **nurture the knowledge creation and technology transfer** that drives transformative change, we will seek, encourage and support faculty and student research that demonstrates academic distinction, value to industry, and the promise of breakthrough discoveries in targeted technical areas. This will require expanded laboratory facilities, additional staff support, and continued investment in new equipment and instrumentation.



Strategies & Action Items

> Faculty Workload Models

We will develop appropriate faculty workload models that simultaneously target individual strengths and departmental goals. These models will address teaching responsibilities as well as expectations for innovation and scholarship productivity levels.

> Resources

We will acquire necessary infrastructure and resources to allow faculty to engage in cutting-edge research in key targeted areas. This includes:

- expanded laboratory facilities for teaching as well as for creative research
- additional technician support for the training of students and supporting research activities
- new equipment and instrumentation to equip research staff and faculty engaged in creative research and scholarly endeavors

> Enhance Our Reputation

We will enhance our national and international reputation as a premier research department by:

- establishing leadership at national levels in targeted research areas
- following an aggressive publication protocol in leading peer-reviewed journals
- assuming roles as editors of top journals and conference proceedings
- organizing and chairing sessions at key technical conferences
- actively participating in targeted national technical committees and society leadership positions
- developing consortia with industry and government partners
- expanding classroom technology to allow faculty to engage in scholarly activities while maintaining student engagement



Chancellor Cheryl B. Schrader, pictured left, and Dr. John Myers.

Research Award

John Myers, associate professor of structural engineering, received a Research Award for 2012. This award is given annually and recognizes excellence in research activities.

 research.mst.edu

Targeted areas

- ★ building sustainability
- ★ energy infrastructure and environmental impacts
- ★ infrastructure materials
- ★ health-threatening environmental pollutants – detection, assessment, and counter-measures
- ★ resilient infrastructure systems under multi-hazard/extreme loads
- ★ advanced engineering educational methodologies

Task List

- ➔ **Identify and maintain funding streams** to support faculty development activities, technician hires, IT investments and matching monies for proposals in targeted areas.
- ➔ **Hire an increased number of adjunct faculty outside of Rolla** to maintain instructional program course offerings.

Campus Lever

2.2

Promote Missouri S&T as Missouri's technological research university

2.3

Develop culture of excellence in research and creative activity

3.3

Improve facilities to enhance research and student learning



FACULTY EXCELLENCE FELLOWSHIP PROGRAM

One of the most critical components in building a successful academic department is attracting and retaining great faculty talent. The quality of the professors in a department is key to succeeding in a university setting, both in classroom teaching and in building an academic reputation among national and international peers. This reputation will attract high-potential students at all levels in the region, across the nation and around the world.

As an important component of the Vision 2020 Strategic Plan to invest in faculty development, the Civil, Architectural and Environmental Engineering Department will initiate a Faculty Excellence Fellowship Program, which will provide growth opportunities to deserving early- and mid-career faculty in the form of career-path incentives and discretionary monetary funds.

Innovative faculty that show promise through excellent performance are worthy of investment. Extra support for a proven innovator can be translated into accelerating a brilliant emerging career. Providing top-performing faculty with funding, whether to further develop a novel idea or to visit a national laboratory to build collaborations, is also a measurable incentive for continued excellence.

We aim to be proactive at retaining great minds. Investment in the Faculty Excellence Fellowship Program will allow our

department to clearly and tangibly express the value of excellence by showcasing faculty member efforts and productivity. This is especially important for peers and new faculty as they join our team — and may be the start of a legacy built at Missouri S&T.

The Faculty Excellence Fellowship Program will transform our department and the lives of Rolla-trained civil, architectural and environmental engineers for generations to come. The program, supported by private investment, will support “rising star” faculty members who are focused on the development and application of new knowledge that is critical not only to the future of our field, but also to community infrastructures and lives worldwide.

If we are to continue our department’s impressive growth as home to some of the nation’s top civil, architectural and environmental engineering programs, we must deepen our commitment to recruiting and retaining faculty who will support and further the department’s interdisciplinary education and research portfolios, and who will nurture knowledge creation that demonstrates academic distinction, value to industry, and the promise breakthrough discoveries in targeted technical areas. This is one of the cornerstones of the department’s Vision 2020 Strategic Plan, and the Faculty Excellence Fellowship Program is an integral building block to the future.

Who will be
the next
“Rising Star”



Attract



“As with any organization or business, it is all about the people. At Missouri S&T, the Chancellor, the CArE Engineering Department Chair and faculty are doing an excellent job managing growth and improvements with limited resources. The faculty and the students define the university’s character and quality. Good faculty attract good students, and as a whole, they maintain and grow the good name and reputation of the department that we are so proud of. With diminishing support from the State of Missouri, it is up to alumni and friends to provide the financial support that is required to attract and retain good faculty.”



Frank Benavides, CE'70
St. Louis, Missouri

— Frank Benavides





MAPA Endowed Professorship
Pictured left to right: Chris Yarnell,
Dr. William Schonberg, Dr. Dave Richardson,
Larry West and Dale Williams.

**Chancellor Schrader and
Bryan Stirrat, CE'67**
President, Bryan A. Stirrat & Associates

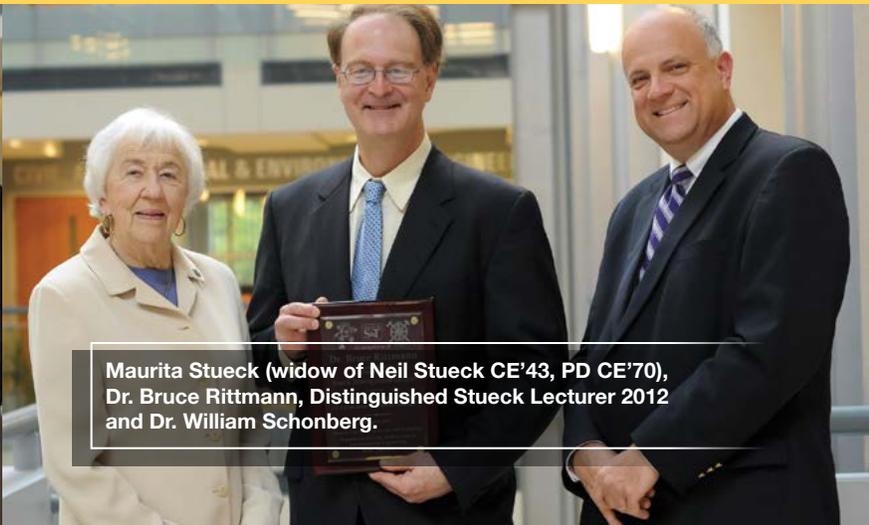


Gary White, CE'85, MS CE'87
Executive Director and Co-Founder
water.org

Achieve



Left to right: Site Onyejekwe, PhD CE'12, S&W Graduate
Fellow, Tom Abkemeier, CE'87, MS CE'92 and Mrs. Richard
Frueh (widow of Richard Frueh CE'75, Emgt'75, PD CE'03),
Amy Krauch Morris, CE'06, MS CE'08, S&W Graduate Fellow
and Kyle Kershaw, CE'99, PhD CE'11.



**Maurita Stueck (widow of Neil Stueck CE'43, PD CE'70),
Dr. Bruce Rittmann, Distinguished Stueck Lecturer 2012
and Dr. William Schonberg.**



BUILDING THE BEST

Higher education is at a crossroads. Missouri S&T, as well as numerous of other universities across the nation, are faced with great challenges. These have been identified in the campus strategic plan and are as follows:

■ **The need to remain affordable and accessible amid dwindling resources from state and federal sources.**

Today, the value of a college education is under more scrutiny than ever, so it is crucial that Missouri S&T demonstrate that value in terms of offering a high return on investment.

■ **The need to be accountable to our students and their families, as well as the public, our research partners, donors, employers, state and federal funding agencies, and many others.** Again, by demonstrating our value in specific, measurable terms, we will address this challenge.

■ **Changing demographics and globalization.**

As our world becomes more and more interconnected, S&T must address the requirements of a global society. This means preparing our students to enter a world that doesn't look like it did 20 or even 10 years ago. Our graduates must be able to work and thrive in a world of diverse cultures and viewpoints.

■ **Environmental, fiscal and social sustainability.**

We must balance our need for fiscal solvency with our duty to uphold the greatest standards of integrity, environmental stewardship and social awareness. Universities must maintain the greatest ethical standards and serve as role models for the rest of the world.

■ **The pace of technological change continues to accelerate and disrupt conventional approaches to learning, discovery and engagement.**

To address these challenges, graduates of Missouri S&T's Civil, Architectural and Environmental Engineering Department must be prepared to excel in an ever-changing world.

Whether our students are designing an infrastructure with a zero energy footprint, bringing clean water to a remote village, leading a multinational team of social entrepreneurs, or building a suspension bridge with advanced engineering materials, they must have the flexibility, education and foresight to lead.

Our department is committed to implementing a strategic plan that will help us better prepare our students for the engineering and leadership challenges they will face.

We invite you — our alumni, our industry partners, and our friends — to help us achieve these goals, and to join us on this exciting journey to 2020 and beyond!



Academy of Civil Engineers 2013

ADVANCED CONSTRUCTION MATERIALS LABORATORY

Missouri S&T has always been a forward-looking institution, dedicated not only to preserving the past, but also to embracing the future. Now we are looking ahead to the next phase of enhancing our research capacity and impact by investing in new faculty lines, technical staff and laboratory infrastructure in the growing area of civil engineering structural materials.

The **Advanced Construction Materials Laboratory** will create a new home for the advancement of construction materials development by significantly adding to the facilities involved in the design, testing, monitoring and evaluation of new and repaired structures.

S&T has identified transportation infrastructure as one of its top investment priorities. This new expanded facility will grant students and researchers the ability to develop innovative and sustainable cement-based materials that will be used to maintain our country's aging infrastructure, as well as design the next generation of resilient construction materials. The development of new "green" technologies in particular will ultimately lead to cost savings, extension of service life and a reduction in the carbon footprint of construction activities.

3D View

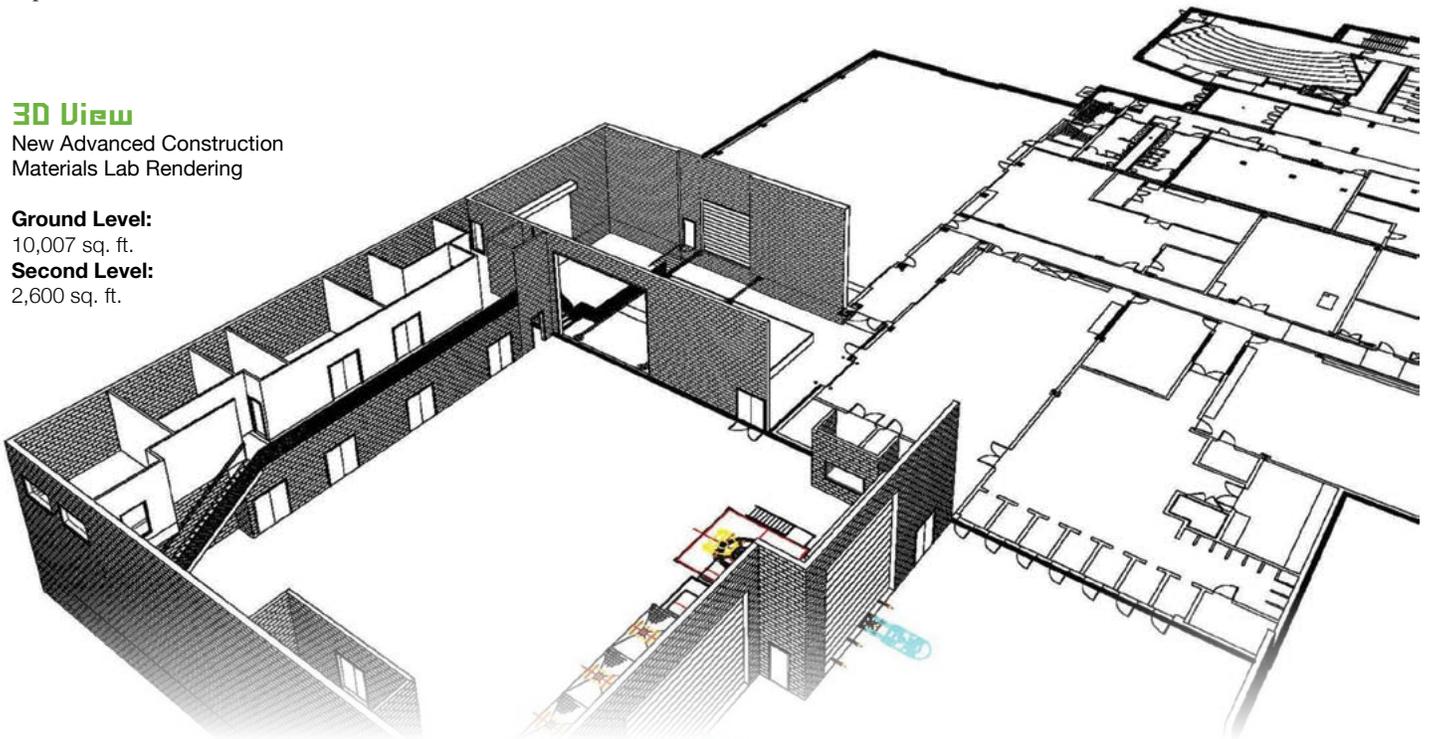
New Advanced Construction Materials Lab Rendering

Ground Level:

10,007 sq. ft.

Second Level:

2,600 sq. ft.





Concrete Testing
Researchers test the shear behavior of high strength self-consolidating concrete for MoDOT and USDOT.

New Opportunities

This new state-of-the-art laboratory has been ranked as a top need in the Civil, Architectural and Environmental Engineering Department.

When fully operational, this unique laboratory will give S&T investigators a competitive edge and will help build our reputation as one of the nation's leading teaching and research universities. It will provide an interactive area to promote educational and experiential learning for undergraduate, graduate and post-graduate students. It will foster collaboration among investigators, enhance the breadth of interdisciplinary research activities and develop close working relationships with industry partners.

The Design

Missouri S&T has already developed a preliminary design for this laboratory expansion. The proposed 16,000 GSF design will house state-of-the-art research infrastructure, including 35 new pieces of equipment (valued at approx. \$2.5 million), whose acquisition was made possible by a grant from the U.S. Department of Transportation.

Project Support

The estimated cost of the proposed expansion is \$7 million. Fully funding this project will require private support to make it a reality. A current opportunity exists to leverage private donor funds with a state program that offers up to 1:1 matching funding for new facilities/renovations, which can reduce the amount of private donor support that needs to be raised to \$3.5M.



450
A record number of undergraduate students.

Photo by B.A. Rupert

The department today

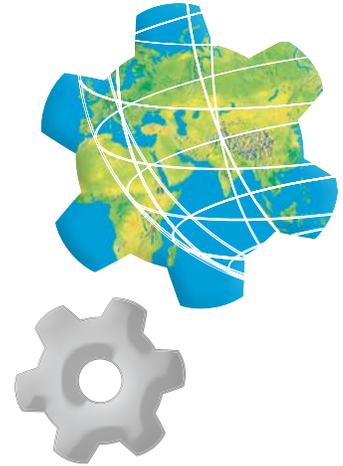
- 450** Undergraduate Students
- 100+** Graduate Students
- 25** Full-time Faculty
- 125** Technical reports/publications by faculty in 2014
- \$150k** Average contract and grant expenditures per research-active faculty member
- 10+** Laboratories and Research Centers
- \$200k** Average annual amount of scholarships awarded
- 7,000** Department Alumni



INVESTING IN THE FUTURE

Vision 2020: Strategic Needs

The following list outlines the financial resources needed to realize the goals of our bold vision. Many opportunities exist at varying levels to help the department carry out its vision of excellence and to reach the target amounts listed below.



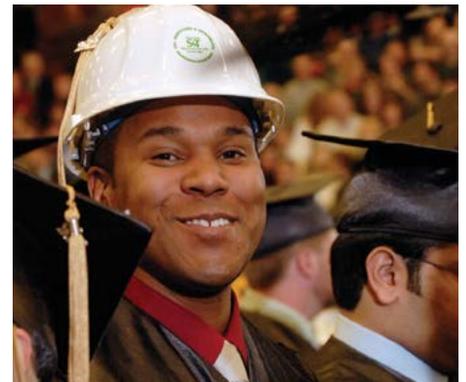
Facility Enhancements*

Advanced Construction Materials Laboratory	\$7.0M
High Performance Building Research Center	\$3.0M



Investment Opportunities*

Student Learning Experience	\$9.5M
Experiential Activities Coordinator	\$1.5M
Professor of the Practice	\$3.0M
Study Abroad Program Fellowships	\$1.5M
Graduate Student Scholars Fellowship Program	\$3.5M
Faculty Development	\$2.4M
Faculty Excellence Fellowship Program.....	\$1.2M
Entrepreneurship and Innovation Program	\$1.2M
Infrastructure Enhancement	\$3.3M
Laboratory Staff Support	\$1.5M
Laboratory Equipment and Instrumentation	\$1.8M



* Multiple opportunities exist within each endowment category and sub-category

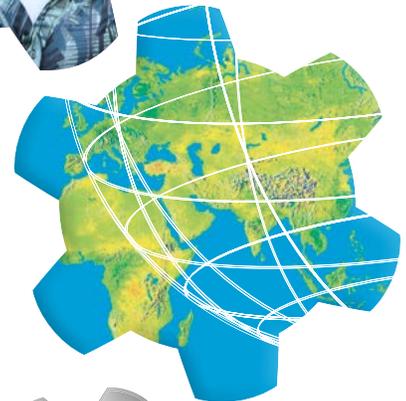
Help make a difference



Through research and innovative solutions to real-world problems, civil, architectural and environmental engineers constantly re-invent the processes, structures and materials that are part of our daily lives.

Tradition, collaboration, diversity, excellence — these are the values we instill in the students who will walk out our doors and into research labs and workplaces of the nation's corporations, government agencies and universities.

Your investment can help provide lessons of a lifetime that will change a student's perspective forever.



For more information about supporting the needs of Vision 2020, contact Joel Burken at 573-341-6547 or email burken@mst.edu.



Prepare globally “street ready” engineers

WHAT DOES THIS MEAN?

We will better prepare our graduates to solve technical and engineering challenges around the world.

HOW CAN YOU HELP?

Fund the Professor of the Practice position; commit to providing internship and cooperative positions for our students.

WHY ARE WE DOING THIS?

We believe that the business and practice of engineering must be integrated into our students' educational experience for them to be successful in their careers.



Attract and retain premier talent at all levels

WHAT DOES THIS MEAN?

We will work extra hard to attract and retain excellent teaching and research faculty as well as students.

HOW CAN YOU HELP?

Establish an endowed fund as a part of the Faculty Excellence Award Program; establish an endowed fund as part of the Graduate Student Fellowship Program.

WHY ARE WE DOING THIS?

We believe that the research faculty do and the graduate students that work with them play an important role in keeping our department and Missouri S&T known as a top technological research university.



Provide unique and modern facilities and experiences

WHAT DOES THIS MEAN?

We will nurture knowledge creation and technology transfer that drives student success, innovation, and breakthrough discoveries.

HOW CAN YOU HELP?

Support the creation of the Advanced Construction Materials Lab, a planned expansion of Butler-Carlton Hall. Laboratory improvements and enhancements are a priority.

WHY ARE WE DOING THIS?

We believe that an important part of success in education and in research is having the right tools for the right job.

On-Campus Programs:

Civil (B.S., M.S., Ph.D.)

- Construction Engineering
- Environmental Engineering
- Geotechnical Engineering
- Materials Engineering
- Structural Engineering
- Water Resources Engineering

Architectural (B.S.)

- Construction Engineering
- Construction Materials
- Environmental Systems
- Project Management
- Structural Engineering

Environmental (B.S., M.S.)

- Air Pollution and Control
- Environmental Chemistry
- Environmental Microbiology
- Geoenvironmental Engineering
- Water and Wastewater Resources Engineering

Online Programs:

Civil Engineering (M.S.)

Environmental Engineering (M.S.)

Certificates:

- Contemporary Structural Engineering
- Geoenvironmental Engineering
- Geotechnical Earthquake Engineering
- Infrastructure Renewal
- Project Engineering and Construction Management



Civil, Architectural and Environmental Engineering
MISSOURI UNIVERSITY OF SCIENCE AND TECHNOLOGY

211 Butler-Carlton Hall, 1401 N. Pine St.
Rolla, Missouri 65409-0030

Phone: 573-341-4461

Website: care.mst.edu