



FROM THE DEPARTMENT CHAIR

Welcome to the department's newsletter for fall 2019. This is news about the achievements of our faculty members and students in the areas of civil and environmental engineering. First of all, effective Fall 2019, students

from all over the world can now pursue an LSU master's degree in civil engineering online. This is a non-thesis option (Practitioner) offered online to practicing civil engineers and requires a minimum of 36 credit hours of approved coursework. A list of the offered online courses can be found on the department's graduate program and LSU Online websites.

Several of our faculty members have won awards and distinctions. You can find them all listed in this newsletter. One of our students has won the Astronaut Scholarship. This is a fine and great achievement. Two of our faculty members sent their students to Holland and England to learn about flood disaster management and environmental sustainability. Our LSU Steel Bridge team ranked in the Top 10 nationally at the AISC Student Steel Bridge Competition. This is a great achievement indeed. Finally, one of our graduate students was awarded a prestigious fellowship.

I hope that you will find this newsletter and the material it contains useful and informative. This is the last newsletter this year. I wish our students good luck on their theses and exams. The next newsletter will be issued in the Spring of 2020. I wish you all Merry Christmas (or Happy Holidays) and a Happy New Year.

In closing, more and more of our esteemed alumni are now in the know about our departmental happenings through various channels of information, such as this newsletter or online and social media, allowing them to be more supportive of our CEE Department at LSU. I would like to extend an invitation for you to join us, as well as encourage you to send us any of your achievements and various accomplishments, so we can share them not just in upcoming newsletters, but on all of our media channels.

Thanks and Best Regards

George Z. Voyiadjis
Chair and Boyd Professor

DEPARTMENT NEWS

DEPARTMENT LAUNCHES ONLINE MASTER'S DEGREE

The Department of Civil & Environmental Engineering is pleased to announce the launch of the newest graduate program in civil engineering. Market surveys showed a huge interest in our face-to-face master's program, but work and life commitments were noted barriers to pursuing this goal. Effective Fall 2019, however, 150 years after LSU awarded its first degree (the Bachelor of Science in civil engineering in 1869), students from all over the world can pursue an LSU master's degree in civil engineering online.

The curriculum was designed with a focus on transportation engineering. Thirty-six credit hours of graduate-level courses have been converted for online delivery, covering areas such as pavement, traffic, geotechnical, and bridge engineering. Our faculty are excited about the opportunity to reach a larger audience and help educate the next generation of engineers in the field of transportation engineering. The nation will need a workforce of qualified engineers to help expand, upgrade, and rehabilitate our infrastructure. LSU will not only be a part of the solution, it will be a leader in the effort.

To view detailed information about the program, such as admission requirements and course offerings, please visit www.online.lsu.edu.

THE USE OF AUTONOMOUS VEHICLES IN HURRICANE EVACUATIONS



Dr. Brian Wolshon, professor of transportation engineering in the Department of Civil and Environmental Engineering and director of the Gulf Coast Center for Evacuation and Transportation Resiliency, visited the Baton Rouge Rotary Club earlier this semester to share his research on the potential of autonomous vehicles

in Louisiana to reduce congestion on roadways and enable faster hurricane evacuations.

There are five levels of automation in vehicles that are considered self-driving, and many vehicles on the road today are already equipped with level-two automation. This includes features such as safety breaking, lateral lane control, and cruise control. Level-five autonomous vehicles require no driver assistance and use a computer to press the gas pedal and brake, as well as steer.

The use of autonomous vehicles, Wolshon said, could extend beyond daily commuting. Louisiana faces hurricanes, which sometimes leads to mandatory evacuations. If autonomous vehicles were used during a hurricane evacuation, it would enable residents to arrive at shelters faster because the routes would be optimized, and vehicles could communicate with each other to reduce traffic jams.

“Louisiana, without a doubt, is the world leader,” Wolshon said. “We can move more people in shorter amounts of time in an emergency situation than anywhere else. We have a great plan here, but we could enhance it; we could use some of these technologies in an evacuation situation.”

LOUISIANA IS SINKING: LSU'S C4G

HELPS MEASURE SUBSIDENCE



Louisiana is officially sinking. It has been 29 years since the National Geodetic Survey measured the state's subsidence. After completing four absolute

gravity observations this past year, with the help of LSU's Center for GeoInformatics (C4G), the NGS's most recent findings show the state's change in elevation.

“This is the second observation NGS has performed in Louisiana, with the first one having taken place at the University of New Orleans in 1989,” LSU Chief of Geodesy Cliff

Mugnier said. “Since then, the four additional observations through 2018 show a cumulative apparent subsidence of 147 mm in 29 years, which is 5 mm a year.”

A closer look at the elevation changes over the last three decades shows that Baton Rouge, Lafayette, Oakdale, Hammond, and Shreveport have remained virtually unchanged while other areas weren’t so lucky. Alexandria has subsided -49 mm, Old River -34 mm, Lake Charles -16 mm, Boothville -13 mm, and Ruston -9 mm. Some areas actually gained ground, such as Thibodaux +7 mm, Sicily Island +8 mm, Rayville +13 mm, and Natchitoches +17 mm.

“Changes in the absolute value of gravity at a location can be a result of uplift/subsidence, as well as variations in groundwater and tectonic motion,” Mugnier said. “In a generally homogenous sedimentary basin such as Louisiana, it’s likely some combination of subsidence and groundwater.”

LSU C4G now has a three-person, permanent gravity survey crew that travels to all C4G GPS Continuously Operating Reference Station sites statewide and tide gauges collocated with CORS sites throughout the northern rim of the Gulf of Mexico for the observation of absolute gravity and for deflection of the vertical.

“These observations are expected to contribute to the knowledge of the surface motions of the state, as well as to form the basis of a new quasi-geoid model for Louisiana in collaboration among the National Geospatial-Intelligence Agency, NGS, and LSU,” Mugnier said.

One can only hope that the coming decades will show Louisiana is still afloat.

FACULTY NEWS

EUROPEAN ACADEMY OF SCIENCES NAMES VOYIADJIS AS FOREIGN FELLOW MEMBER



Boyd Professor and Chair of the LSU Department of Civil & Environmental Engineering George Voyiadjis has been elected a Foreign Fellow Member of the European Academy of Sciences.

The organization—which was recognized by Royal Decree in 2003 by Albert II, king of Belgium—is a fully independent, international association of distinguished scholars that aims to recognize and elect to its membership the best European scientists with a vision for Europe as a whole, transcending national borders and with the goal of strengthening European science and scientific cooperation. Academy activities include fostering new scientific and technological approaches, assisting in the creation of businesses built on advanced technologies, strengthening international scientific cooperation, and promotion of new discoveries via international workshops and special publications.

“This is a great honor for me, and I’m proud to be recognized by my peers in such a way,” Voyiadjis said. “I’m also looking forward to representing LSU and the College of Engineering among my European counterparts, whom I first collaborated with in 2004.”

PAPER FEATURED IN EDITOR’S CHOICE SECTION



Dr. Mostafa Elseifi, professor of transportation engineering in the Department of Civil and Environmental Engineering, had his paper selected for the Editor’s Choice section of the Journal of Transportation Engineering Part B: Pavements page in the ASCE Library. The paper is titled Cost-Effectiveness and Optimal Timing of Crack Sealing in Asphalt Concrete Overlays. It was co-authored by recent CEE graduates Momen Mousa and Mohammad Bashar. It can be found in Volume 145, Issue 3 of the publication.

LSU AND LTRC RESEARCH WINS BEST PAPER FOR SUSTAINABILITY WORK



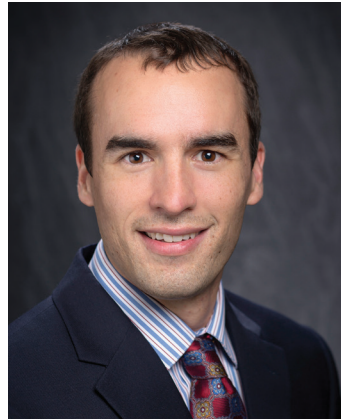
A group of researchers from LSU's Department of Civil and Environmental Engineering, Department of Chemistry, and LTRC were recently honored at the 2019 meeting of the Association of Asphalt Paving Technologists (AAPT). The group included CEE's Dr. Louay Mohammad, Dr. Samuel Cooper III, and Dr. Samuel Cooper Jr. Their study titled, Impact of Various Crumb Rubber Modifications on Asphalt Binder and Mixture Properties, was awarded the Walter J. Emmons Award for best paper.

Their research explored the performance benefits of using sustainable materials in flexible pavement construction, specifically the use of waste tires (also known as crumb rubber) as an asphalt binder modifier used in asphalt mixtures. The findings of this research have resulted in updates to the DOTD's 2016 specifications. The new rubber specification places a limit on the maximum allowable rubber modification rate of 10 percent. The new specification also allows the use of cryogenically ground crumb rubber, which was previously not allowed.

FACULTY ACCOLADES



Dr. Ayman Okeil was selected to serve as associate editor for ASCE JCC. He will cover primarily external strengthening systems and reliability for structures incorporating FRP elements, with expertise on both experiments and analysis/modeling.



Dr. Samuel Snow, alongside Dr. Geoffroy Lesage of the University of Montpellier, was jointly honored with the Thomas Jefferson Award from the French-American Cultural Exchange Foundation. This two-year award will allow Snow and Lesage to further their efforts to design sustainable wastewater treatment technologies by traveling to visit each other's laboratories.



Dr. Murad Abu-Farskah's publication was recognized at the 5th Annual Inventorship Showcase hosted by the LSU Office of Innovation & Technology Commercialization. The paper was titled Advances in Analysis and Design of Deep Foundations.



Dr. Mostafa Elseifi was elected an ASCE Fellow, effective June 2019.

DR. SABARETHINAM KAMESHWAR JOINS CEE FACULTY



Dr. Sabarethinam Kameshwar is new to the LSU Department of Civil and Environmental Engineering faculty this fall. Previously, he was a postdoctoral research scholar at Oregon State University, where he worked for the Center of Excellence in Community Resilience Planning funded by the National Institute of Standards and Technology.

Kameshwar received his PhD in civil engineering from Rice University and his bachelor's in civil and environmental engineering from Indian Institute of Technology Guwahati in India. His teaching interests include structural reliability, infrastructure resilience and sustainability, Monte Carlo methods, random vibrations, finite element methods, and analysis of determinate and indeterminate structures.

His research focuses on infrastructure and community resilience to extreme events, which has also been the focus of several Presidential Policy Directives. Specifically, he works on advancing the understanding of extreme event performance of infrastructure components by combining a variety of tools, such as high-fidelity finite element analysis, uncertainty quantification methods, and surrogate modelling. His research also aims to link the performance of infrastructure systems to community resilience by systematically studying the links and interdependencies between infrastructure, social, and economic systems.

Infrastructure Resilience to Extreme Events

Kameshwar's past research on transportation infrastructure has focused on developing fragility functions for bridges using surrogate models for different extreme events, such as earthquakes, hurricanes, barge collisions, and scour. These fragility functions provide the conditional probability of damage for a given level of hazard intensity and bridge characteristics. Since resilience to extreme events focuses on initial damage, post-event functionality, and the time to restore damaged components, Kameshwar also developed methods for assessing the post-event functionality and restoration time for bridges damaged during extreme events. He has applied these models at the regional level to assess the seismic resilience and sustainability of the road network in Memphis, Tennessee. Figure 1 shows the post-earthquake traffic flow in the network, along with traffic restrictions on damaged bridges.

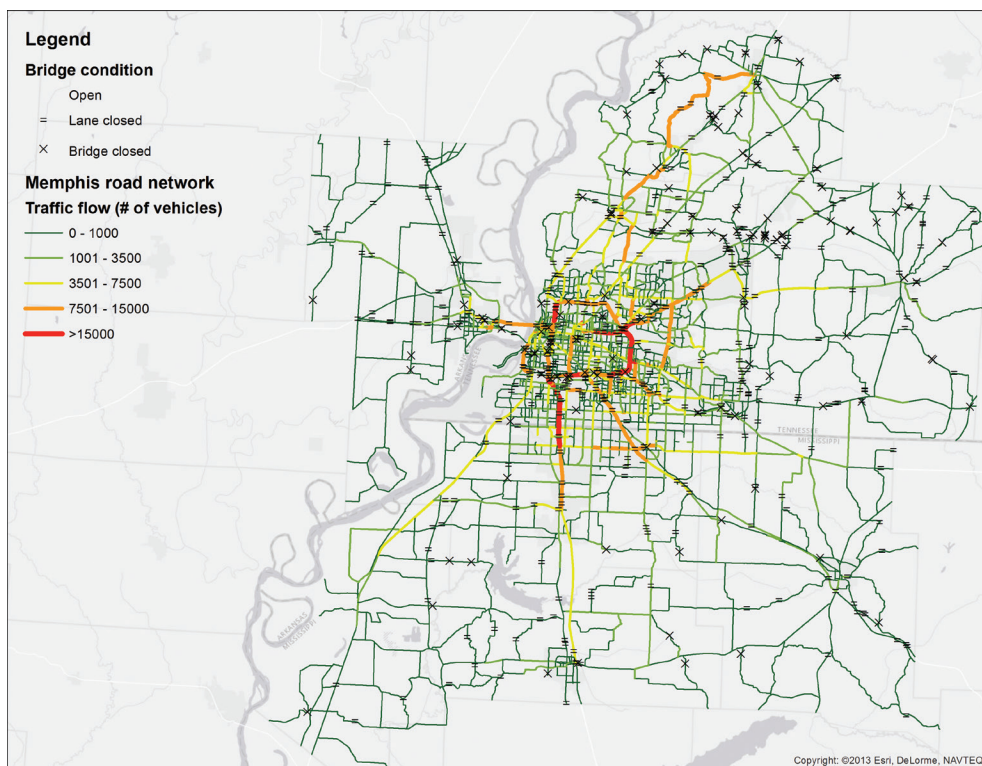


Figure 1: Post-earthquake road network condition

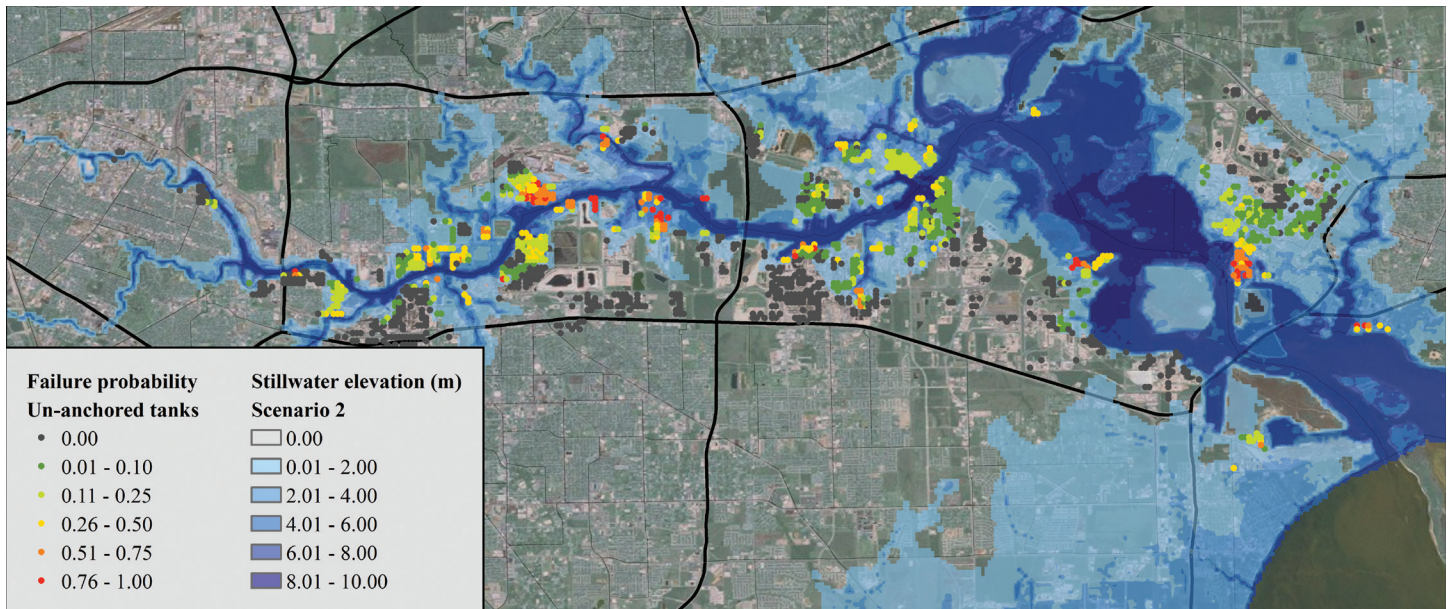


Figure 2: AST Vulnerability in Houston Ship Channel

Kameshwar’s research also focuses on above-ground storage tanks (ASTs), a key component of the petrochemical and energy infrastructure. He developed surrogate model-based fragility, functionality, restoration, and loss models for ASTs subjected to hurricane storm surge and wind loads. He applied these models to assess the vulnerability (i.e., probability of failure) of more than 4,500 ASTs in the Houston Ship Channel, shown in Figure 2, for a 500-year storm surge scenario. The U.S. Army Corps of Engineers has also considered these models for regional storm surge mitigation planning. Furthermore, in collaboration with researchers from social science, Kameshwar has studied the risk of oil spills from these tanks to the surrounding communities in the Houston Ship Channel.

The focus of his ongoing and future research is to understand the extreme event performance of essential facilities and critical infrastructure—such as hospitals, potable water systems, and electric power systems—that are crucial in the aftermath of extreme events. Specifically, his research will focus on addressing local problems faced by communities in Louisiana, such as issues related to flooding and hurricanes. Furthermore, to ensure the resilience of emerging smart cities and communities where cyber and physical infrastructure would become integrated and interdependent, Kameshwar’s research will focus on characterizing the linkages between different cyber and physical systems and advance existing methods to assess and improve the resilience of cyber-physical systems.

Linking Infrastructure Resilience to Community Resilience

Another focus of Kameshwar’s ongoing research is aimed at understanding and modelling the linkages between infrastructure, social, and economic systems. Disruption in any of these systems can have cascading impacts that will affect other systems, which is schematically shown in Figure 3. These impacts have been observed in New Orleans after Hurricane Katrina and in other communities in the aftermath of extreme events and have prevented communities from completely recovering as much as several years later.

To quantify these linkages and combine engineering-based mitigation measures with social science and economics-based strategies, Kameshwar plans to collaborate with researchers from social science and economics to integrate engineering-based tools, such as fragility and functionality models, into population dislocation, housing and business recovery, and models for the regional economy. In the long-term, his research aims to improve the current understanding of the factors that affect community resilience and develop decision-support frameworks that will enable communities to make informed decisions to improve their resilience to extreme events.

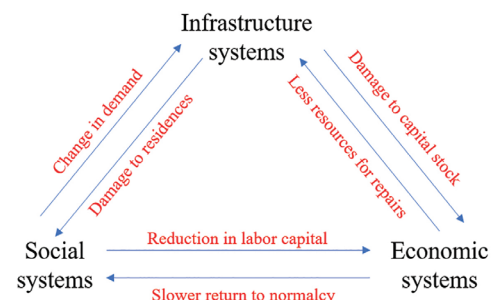


Figure 3: Schematic representation of inter-dependences between different systems

UNDERGRADUATE STUDENT NEWS

STUDENT RECEIVES ASTRONAUT SCHOLARSHIP AND LSU DISCOVER GRANT



Junior environmental engineering major Gabrielle Langlois was awarded the Astronaut Scholarship, making her one of only eight LSU students since 2015 to receive the honor. The award was based on “her outstanding performance across multiple dimensions of her college career.” Langlois also secured funding for her own research projects by earning the LSU Discover grant. “She excels in the classroom, is an impactful leader in numerous extracurricular activities, and was a co-author on a peer-reviewed journal article published this year,” her advisor, Dr. Samuel Snow, boasted.

ENGINEERING ACROSS THE POND

Europe is probably not the first place that comes to mind when talking about flooding and environmental issues, but there are two countries across the pond that share these same problems with Louisiana.

For the past five years, Civil and Environmental Engineering Professor and Environmental Engineering Program Coordi-



nator John Pardue has had his heart set on taking LSU engineering students to Holland and England to learn about flood disaster management and environmental sustainability. This year, his brainchild finally came to fruition.

Over the course of six weeks in June and July, Pardue and LSU CEE Professor Clint Willson accompanied 13 students to Rotterdam and London as part of LSU’s new study abroad program, “Water, Environment and Sustainability.” The program, which offers two three-week courses in each city, is a collaborative effort between LSU and Rice University in Houston, from which five students and one faculty member joined LSU on the trip.

Rice University CEE Professor Philip Bedient taught the first course, Hydrology & Disaster Management, in Rotterdam. The students began it by touring Ouwekerk Watersnood Museum, where they learned about the 1953 North Sea Flood that struck the Netherlands, killing nearly 2,000 people. They also learned about Delta Works, an extensive system of dams and storm surge barriers created in response to this catastrophic flood, and visited Het Keringhuis Public Water Center and Maeslantkerig, a storm surge barrier with movable parts larger than any other barrier in the world.

“The Rotterdam course was very heavy in fluid dynamics, but I’m sure it will become relevant to my work in some way,” said LSU Chemical Engineering senior Gloria Alvarado of Baton Rouge. “The class had similar concepts with [chemical engineering], just with a different application. I really enjoyed seeing the comparisons and applying the same things I was learning. It was awesome to get to explore the Netherlands from a flood protection standpoint.”

“This is absolutely everything that I want to do,” said LSU Environmental Engineering junior Gabrielle Langlois of New Orleans, who also does water quality research for the LSU CEE department. “I got to study all of these amazing defense systems for flood control. I’m from New Orleans, so to see how well controlled it is in the Netherlands, it really inspired me, and I want to bring it back here.”

The Rotterdam trip wasn’t all work and no play. The students also had a chance to explore the area on their own. During their first weekend, Alvarado and her classmates went to Brussels to eat chocolate and French fries, which originated in Belgium. They traveled to Amsterdam the next weekend to visit a few museums and then spent the last weekend in Rotterdam. After checking out of The Student Hotel Rotterdam, the 18 LSU and Rice students boarded a ferry to England, where they took a train from Harwich to Imperial College in London. It’s here that Pardue taught his course—Urban Infrastructure, Environment and Sustainability—which was broken down into five projects.

“I like the way the London class was structured,” Alvarado said. “The first week, we learned about problems London was having in the Victorian age and how they were solved. The second week, we were introduced to problems of today, and

the last week, we combatted those problems with innovation mechanisms and practices. I thought the idea of the class as a whole was really awesome.”

The students began their first project by visiting the top of the Shard, Europe’s tallest building, where they could get a bird’s-eye view of the River Thames. They also learned about the Thames Tideway project in London, which will divert combined sewer overflows from a Victorian system. “The project is one of the largest ongoing urban infrastructures in the world,” Pardue said.

The group then visited the Canary Wharf/Isle of Dogs at the Museum of London-Docklands for the Secret River exhibit, followed by a boat ride to the Thames Barrier, one of the world’s largest movable flood protection devices. They also checked out the Crossness Pumping Station, one of



19th-century English civil engineer Joseph Bazalgette’s Cathedrals of Sewage, an ornate structure that was the southern terminus of Bazalgette’s famous system.

Pardue’s second project examined London’s air quality problems and their relation to the transport sector. Students used their own portable air sensors to take measurements on commuter routes to

determine tradeoffs in low carbon public transport and air quality. They also studied learned methods of computing carbon emissions and the connection between primary and secondary pollutants.

The third project entailed studying London's cholera outbreak and other events mentioned in Steven Johnson's book, *The Ghost Map*. This segment included field trips to historical sites, such the headquarters of the Institution of Civil Engineers to view the new water exhibit, Broad Street, and the John Snow Pub. They also checked out the Water and Steam Museum, where they witnessed a steam engine demonstration.

Pardue's fourth project investigated the role innovation plays in driving changes toward a more sustainable set of urban systems. Students examined sites in greater London that were evidence of this, such as the laboratory of Dr. Michael Faraday and the Royal Observatory in Greenwich, the latter of which is the site of the Prime Meridian and origin of Greenwich Mean Time.

The fifth and final project focused on sustainable building design and included a trip to BRE Innovation Park in Watford, where students mainly worked on several software tools in the classroom.

Of course, there was also time for the students to enjoy themselves, allowing Alvarado to fulfill a childhood dream.

"Outside of class, my favorite thing was going to Wimbledon," she said. "I grew up playing tennis and watching tennis with my parents and friends, so it was really cool. Class was structured in such a way that we would have exams on Fridays, so we essentially had three-day weekends when we could explore."

Langlois said that seeing the different cultures and ways of life was the best part of the trip.

"It was really cool to see cultures push global sustainability," she said. "It was an amazing experience."

Pardue plans on offering this study abroad program to LSU engineering students next year, with hopes to once again partner with Rice University.

"The students worked great together," he said. "We would love to have 10 students from both universities next year, and I will go back each year. We put a lot of work into this program." Bedient agreed that his students also had a pleasant experience working with LSU. "The Rice and LSU interactions were amazing in both Rotterdam and London," Bedient said. "The students got along very well and it was a very enriching experience."

LSU STEEL BRIDGE TEAM PLACES TOP 10 AT NATIONAL LEVEL

This year's LSU Steel Bridge team did what only one other has been able to do in the last 20 years—rank in the top 10 nationally at the AISC Student Steel Bridge Competition. The team finished 10th overall, the highest placement for the organization since 2005.

The annual AISC Student Steel Bridge Competition's objective requires teams to design, fabricate, and compete with a 1:10-scale steel bridge. The bridge is then judged on weight, stiffness, display, construction speed, construction economy, and structural efficiency. More than 250 teams compete across the nation, with only 40 advancing from the regional level to nationals.

The Steel Bridge team is made up entirely of LSU civil engineering students and is a well-established tradition that produces highly experienced and innovative engineers. The

team's mission is to provide hands-on education and experience to LSU students pursuing a career in structural engineering. From conception to design, this is a student-driven project that teaches practical techniques for the professional engineering world. Success requires effective teamwork and application of engineering principles and theory. Students must innovate, practice professionalism, and use structural steel efficiently.

The 2018-2019 team is extremely proud of their accomplishments and are hopeful for an equally competitive outcome in the 2019-2020 year.



*PICTURED LEFT TO RIGHT:
The 2018-2019 LSU Steel
Bridge Team—
Dillon Saladino,
Larry Nguyen,
Keith Furr (co-captain),
Josh Olivier (captain),
Emily Rone,
Eric Wright,
Irvin Gaspar*

Not Pictured: David Fuller



*The LSU Bridge Construction
Team after their successful
timed build at the AISC
Student Steel Bridge
Competition.*

ALUMNI NEWS

CE ALUMNUS NAMED ASSISTANT SECRETARY FOR THE OFFICE OF PLANNING

Louisiana DOTD Secretary Shawn D. Wilson announced in June 2019 that Daniel Magri has been appointed as a new member of his executive staff. Magri earned his bachelor's degree in civil engineering from LSU. He will serve as the next assistant secretary for the Office of Planning, which oversees public transportation, data collection and management systems, transportation planning, and highway safety.

ENGINEER BY DAY, COMEDIENNE BY NIGHT



CEE alumna Heather Deare is not only a successful engineer, but she is also dabbling in the art of stand-up comedy. She graduated from LSU in 2007 and is currently working as a civil engineer with the Louisiana DOTD in the Bridge Design section. She has been designing bridges for nearly her

entire career. In terms of her career in comedy, Deare first took the stage for a charity show in June 2018. She has now performed twice for charity and has also gone through the Leather Apron Theatre Company's improv comedy class in Baton Rouge. She doesn't plan to make stand-up a regular thing as of right now but says she could be convinced to pop onto the NO SHOW Comedy open mic stage at City Bar on Wednesdays at 8:00p.m. To learn more about Deare, visit heatherdeare.com.

GRADUATE STUDENT NEWS

GRADUATE STUDENT AWARDED PRESTIGIOUS FELLOWSHIP



Madhusudan Kamat, a PhD student in environmental engineering, was awarded a prestigious fellowship for his research on advanced oxidation water treatment technologies. Kamat received the Chateaubriand Fellowship, which will allow him to spend a semester in France

pursuing a collaborative line of research with Dr. Geoffroy Lesage and other colleagues at the University of Montpellier. His advisor, Dr. Samuel Snow, explains that "this exciting opportunity fits very well with his ongoing thesis work on understanding the connections between dissolved organic matter and photochemical reactions."

**Department of Civil &
Environmental Engineering**

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ADDRESS SERVICE
REQUESTED

ALUMNI REGISTRATION & UPDATES

The Department of Civil & Environmental Engineering is always interested in how our alumni are doing. We hope you will take the time to send your updates to mlane10@lsu.edu or, if you prefer, you can “snail mail” them to:

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Attn: Madison Lane
3255 Patrick F. Taylor Hall
Baton Rouge, LA 70803-6405**

Please include basic information, such as your full name, year of graduation, degree, mailing address, email address, telephone number, company, and your title/position. For your update, please include information on your recent professional and personal developments, along with a high-resolution photo, if available.

Thanks for staying in touch!

To connect with the LSU College of Engineering, please visit lsu.edu/eng and find us on Facebook at facebook.com/LSUCEE and Twitter at twitter.com/LSU_CEE.