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#### ALUMNI SPOTLIGHT

Santiago Salas Ortiz joins faculty at ESPOL in Ecuador  
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#### CAREER AWARD

Adam Melvin receives \$500k NSF grant  
See page 6

# LSU

## *Chemical Engineering Alumni Magazine*

Fall 2019, Vol. 34



# 5

Consecutive years  
of record-breaking  
graduating classes

# ADVISORY COMMITTEE

Our Advisory Committee is a driving force behind the success of our department. We would like to express our appreciation for their passion, commitment, and leadership.



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Plant Manager  
Methanex–Geismar



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**"For more than a century, our alumni have been transforming raw materials into products, providing critical services, and teaching new engineers and scientists all around the world."**

**JOHN FLAKE**

Affolter Professor, Department Chair

Dear Alumni and Friends,

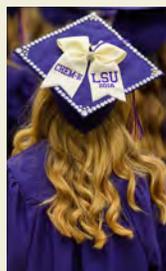
Hello from Baton Rouge, where we are just starting another academic year. In fact, for the past five years, we have broken the record for the number of chemical engineering graduates every year! More than quantity, I am most impressed with the quality of our program, including our faculty, students, and alumni. We now benefit from a cadre of professors like Harry Toups, Brian Hanley, Barry Guillory, Jerry Forest, and John Pendergast who have a depth of industry experience and a passion for teaching. Likewise, we now have 18 tenure and tenure-track faculty who serve as dedicated teachers and world-class experts in research. This year, we also welcome two new assistant professors: Jimmy Lawrence and Craig Plaisance. Jimmy is an expert in polymers, and Craig is an expert in modeling reactions. Further, the quality and drive of our students is as good as I have ever seen. I believe we have one of the most rigorous undergraduate curricula in the country, and our students do a great job of learning the fundamentals of chemical engineering. In fact, our team won second place in the National ChE Jeopardy Competition this year. Two of our undergraduates (Grant Landwehr and Breanna Lee) won highly competitive Graduate Research Awards from the National Science Foundation. Clearly, quality is responsible for much of our growth, and we remain committed to providing one of the best ChE undergraduate programs in the country.

It is also remarkable to note that we have been doing this for 111 years. For more than a century, our alumni have been transforming raw materials into products, providing critical services, and teaching new engineers and scientists all around the world. Last spring, we had the pleasure of welcoming Duncan Schleiss back to give a seminar on advanced controls and automations. Duncan completed his MS in 1983 and went on to be one of the creators of Delta-V, one of the most popular control systems used across the world. We also added Jeremy Baldrige (BS 1999 now at Phillips 66) and James Michiels (BS 2007 now at ExxonMobil) to our advisory committee. This past year, we also took time to recognize three retired faculty in honor of their 80th and 90th birthdays. Many alumni would remember David Wetzel and Art Sterling, who both celebrated their 80th birthday this past year. Likewise, this past year was the 90th birthday for Ed McLaughlin. These men dedicated their working lives as professors and many have benefited from their time at LSU.

It has been a great year, and I'm excited to start again. We are now offering our required ChE courses twice a year to keep class sizes small and give plenty of opportunities for co-ops. We also continue to make significant investments in an already outstanding unit operations laboratory. If you haven't visited campus in recent years, please plan to do so soon. Just drop us a note via email, our website, or Facebook page, or stop by for a visit before a home game in the fall.

Geaux Tigers,

### *On the Cover* | Jessica Mire, BS 2018



"I love this cap decoration. It is a great illustration of how women engineers can still be feminine while working to create and improve processes that are transforming the world. The key is to be authentic to our own identity. There is no value in being less feminine or more feminine, but there is great value in being who we really are."

Sharon Hulgán  
Member, LSU ChE Advisory Committee

*Chemical Engineering Alumni Magazine* is published for the benefit of the LSU Cain Department of Chemical Engineering's alumni, students, and friends.

Comments and suggestions should be directed to:

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# WE ARE FIERCE

We, the LSU Cain Department of Chemical Engineering, have a long history of stressing excellence in both instructional and research efforts and remain committed to excellence in all endeavors.

We are proud of the state-of-the-art facilities on campus that foster learning and research, create an unforgettable student experience, and produce alumni who change the world.

Several members of the chemical engineering faculty have received local or national recognition for outstanding teaching and achievement. They are also active in local and national professional societies. Faculty members are involved in a variety of research areas stressing matters of importance to Louisiana and the nation, including environmental engineering, reaction engineering, catalysis, polymer and textile processing, electrochemical engineering, and biochemical engineering. The faculty also collaborate with colleagues from other departments within the university on joint projects and grants. The breadth of background among the faculty and the ongoing research relevant to the ever-changing needs of the chemical engineer ensure that students receive an up-to-date and thorough education.

## RECENT ADDITIONS



### Jimmy Lawrence

Lawrence joined the faculty in fall 2018 as an assistant professor. He received his PhD in polymer science and engineering from the University of Massachusetts, Amherst, in 2014. His research interests include the development of precision polymer- and nanomaterial-based building blocks to construct high-performance materials, functional materials, and smart/adaptable systems.



### Craig Plaisance

Plaisance also joined the faculty in fall 2018 as an assistant professor. He received his PhD in chemical engineering from the University of Virginia in 2012 (he received his MS at LSU in 2005 under the direction of Kerry Dooley). His research interests include developing a theoretical molecular-level understanding of and applying multiscale modeling approaches to study heterogeneous catalysis and electrocatalysis.

## AWARDS & HONORS

### Chris Arges

Arges received a 2019 LSU Alumni Association Rising Faculty Research Award. The award recognizes faculty at the rank of assistant professor who have outstanding records of scholarship and published research. In addition, Arges received a 2019 Tiger Athletic Foundation Undergraduate Teaching Award. This comes with a one-time cash prize.

### Jerry Forest

Forest has been elected to the position of second vice chair for the AIChE Safety and Health Division. He will serve as second vice chair in 2019, vice chair in 2020, and chair in 2021.

Forest is the senior director of process safety at Celanese. He has more than 30 years of petrochemical and refining experience, with a strong manufacturing background in isocyanates, hydrazine propellants, and refining at Celanese; as well as LyondellBasell and predecessor companies Lyondell, ARCO, and Olin. His mission is to apply 20 years of manufacturing experience to process safety to save lives, protect the environment, and preserve jobs by preventing process safety incidents. Forest donates his time as an adjunct instructor on process safety.

### Adam Melvin

Melvin received the 2019 Dow Excellence in Teaching Award (see page 22), as well as the 2019 TAF/LSU Discover Undergraduate Research Mentor Award and an NSF CAREER Award (see page 6).

## John Pendergast

Pendergast (et al.) was awarded US Patent No. 10,144,698, which is a process for breaking a methanol/methyl methacrylate azeotrope using pressure swing distillation.

A methanol/MMA azeotrope is broken or avoided by a method comprising the steps of (1) raising the pressure within a first vessel, e.g., a distillation column, that contains a methanol/MMA azeotrope; (2) collecting the azeotrope as a liquid, and then in a second, separate vessel, e.g., another distillation column; and (3) raising the pressure sufficiently to allow for the breaking of or avoidance of the azeotrope and the recovery of the methanol.

Pendergast joined the faculty in spring 2018 as a part-time instructor. He received his MS from Louisiana Tech University in 1977. He comes to us after a 40-year career with Dow. He serves the department as the Engineering Fundamentals Lab instructor. In addition, Pendergast is a preeminent expert on distillation columns and is in the process of designing one for our Unit Operations Laboratory.

## K. T. Valsaraj

Valsaraj, Roddey Distinguished Professor and Ike East Professor of Chemical Engineering, can now add four very important letters after his name—FRSC.

**"I feel really honored to be selected a Fellow of the oldest chemical society in the world; RSC is celebrating its 175th anniversary. To me, all my accomplishments are a result of not only my work, but also of all the students and postdocs who have worked with me over the years."**

**K. T. VALSARAJ**

Fellow, Royal Society of Chemistry

Valsaraj has been elected a Fellow of the Royal Society of Chemistry, which is headquartered in London. Individuals are eligible to become a Fellow if they've spent more than five years in a senior position and their efforts have made an impact in any field of the chemical sciences.

Valsaraj earned his PhD from Vanderbilt University in 1983. His research areas include environmental chemical engineering, atmospheric chemistry, and wastewater treatment. He holds two patents, has published more than 200 journal articles, and recently served the university as vice president of research and economic development. He is also a fellow of the American Institute of Chemical Engineers, American Association for the Advancement of Science, and the National Academy of Inventors.

### About the Royal Society of Chemistry

The RSC has more than 54,000 members and is the United Kingdom's professional body for chemical scientists. Its mission is to advance chemistry as a science and develop its applications, disseminate chemical knowledge, maintain professional qualifications, set high standards of competence and conduct for professional chemists, provide information and advice on issues involving the science and practice of chemistry at all levels, and to serve the public interest while remaining completely objective.



## RAISING THE BAR

### TAF/LSU Discover Undergraduate Research Mentor Award

LSU Discover is proud to announce that the winner of the 2019 Tiger Athletic Foundation/LSU Discover Undergraduate Research Mentor Award is [Adam Melvin](#). This award honors faculty who actively and effectively guide undergraduate researchers, helping them to move toward independent work and encouraging them to publish or present their findings. Melvin was honored at the annual LSU Distinguished Faculty Awards ceremony.

Melvin was nominated by undergraduate researchers Joshua Campbell and Grant Landwehr. Here is a selection of quotes from their nomination letters.

"Personally, [Dr. Melvin] has garnered an interest in me for conducting research by sharing his passion of learning and discovery and passing on the knowledge he has gained from past research. He exhibits all the qualities that a great mentor should: the knowledge necessary to move students forward, the encouragement to keep students involved, high expectations for students to perform accordingly, and—most importantly—the time required to go above and beyond what students need to be successful while conducting research. Dr. Melvin is very much appreciated by all the students who work for him in our lab, and that appreciation is certainly well deserved."

-Joshua Campbell, BS 2019

"Although Dr. Melvin is responsible for a multitude of research projects, graduate students, undergraduate students, and teaching, he still finds a way to keep a high level of personal involvement in all of the projects while still allowing for autonomy and creative input from his students. An important aspect of Dr. Melvin's interactions with his students is his availability to meet and discuss projects and his willingness to set aside time for us. Dr. Melvin entrusts his undergraduate students with projects with high levels of complexity, so communication plays a critical role in the success of these projects. Thanks to Dr. Melvin's guidance, [my] project has developed into one of the most rewarding experiences I have had while at LSU and turned into a first author publication for me."

-Grant Landwehr, BS 2018

Melvin obtained a BS in chemical engineering and a BA in chemistry from the University of Arizona in 2004, an MS in chemical engineering (with a minor in biotechnology), and a PhD in chemical engineering from North Carolina State University in 2010. He

was an NIH Postdoctoral Fellow at the University of North Carolina at Chapel Hill in the departments of chemistry and biomedical engineering from 2010-13. In August of 2013, he joined the faculty as an assistant professor. His research interests include biochemical/biomolecular engineering, biosensors, microfluidic devices, single cell analysis, personalized diagnostics, chemical biology, cancer metastasis, peptide inhibitors, algal migration, and novel teaching approaches, including active learning, academic integrity, and flipped classrooms. He has several ongoing research projects that are funded by the NSF and NIH and was recently awarded an NSF CAREER award. He is also the co-director of an NSF-sponsored REU site at LSU, combining entrepreneurship and energy research. During his time at LSU, Melvin has had the pleasure of working with nine graduate students, 41 undergraduate students, and 15 high school students on over 30 different projects.

### NSF CAREER Award

The National Science Foundation recently awarded [Adam Melvin](#) a \$500,004 grant as part of its Faculty Early Career Development (CAREER) Program for his work on developing new peptides to control protein degradation, which can be used in diagnosing cancer and diabetes.

One central control system for protein degradation in cells is referred to as the UPS, or ubiquitin-proteasome system. The activity of the enzymes in the UPS, like the proteasome, is highly variable across individual cells in a population; therefore, it is important to be able to measure proteasome activity on a single-cell basis. Melvin's project will develop fluorescent sensors to do just that.

These sensors could enhance efforts to develop new drugs and optimize treatment strategies on a patient-by-patient basis. As part of this project, Melvin is also designing new peptides to selectively target so-called "undruggable" proteins to proteasome as a new approach in diabetes in obesity-related therapeutics. Hands-on learning modules will also be developed and presented to middle school students in the Baton Rouge area. Undergraduate and high school students will be recruited to participate in extended research experiences in an effort to develop and populate a robust biomanufacturing workforce.



**JOSHUA CAMPBELL**

**BS 2019**

Ceremony  
Engineering  
Building

## RECENTLY PUBLISHED ARTICLES

### July 2019

Applied Thermal Engineering | "Joint dynamic data reconciliation/parameter estimation: Application to an industrial pyrolysis reactor" | G. Fadda, Jorge A. Chebeir, Santiago David Salas, and Jose A. Romagnoli

### June 2019

Nature Communications | "Directed propulsion of spherical particles along three dimensional helical trajectories" | Jin Gyun Lee, Alan M. Brooks, William A. Shelton, Kyle J. M. Bishop, and Bhuvnesh Bharti

Chemical Physics Letters | "Efficiency enhancements of a restricted stochastic search algorithm for locating local and global minima" | William C. McKee, Saurin H. Rawal, and Ye Xu

Journal of Fluids Engineering-Transactions of the ASME | "Effective Geometric Algorithms for Immersed Boundary Method Using Signed Distance Field" | Chenguang Zhang, Chunliang Wu, and K. Nandakumar

### May 2019

Journal of Physical Chemistry C | "Effects of Weak Electric Field on the Photoluminescence Behavior of Bi<sup>3+</sup>-Doped YVO<sub>4</sub>:Eu<sup>3+</sup> Core-Shell Nanoparticles" | Khashayar R. Bajgirani, Pragathi Darapaneni, Adam T. Melvin, and James A. Dorman

Catalysis Science & Technology | "CO<sub>2</sub> electrochemical reduction at thiolate-modified bulk Au electrodes" | Yuxin Fang, Xun Cheng, John C. Flake, and Ye Xu

Journal of Physical Chemistry C | "Effect of Moisture on Dopant Segregation in Solid Hosts" | Pragathi Darapaneni, Natalia S. Moura, Darrell Harry, David A. Cullen, Kerry M. Dooley, and James A. Dorman

Plos One | "FluoroCellTrack: An algorithm for automated analysis of high-throughput droplet microfluidic data" | Manibarathi Vaithiyathan, Nora Safa, and Adam T. Melvin

Analytical and Bioanalytical Chemistry | "Population-based analysis of cell-penetrating peptide uptake using a microfluidic droplet trapping array" | Nora Safa, Manibarathi Vaithiyathan, Shayan Sombolostani, Seleipiri Charles, and Adam T. Melvin

### April 2019

Journal of Physical Chemistry | "Directed Pore Uptake and Phase Separation of Surfactant Solutions under Confinement" | Yao Wu, Yingzhen Ma, Lilin He, Gernot Rother, William A. Shelton, and Bhuvnesh Bharti

Physical Review B | "Fermions and bosons in nonsymmorphic PdSb<sub>2</sub> with sixfold degeneracy" | Ramakanta Chapai, Yating Jia, William A. Shelton, Roshan Nepal, Mohammad Saghayezhian, John F. DiTusa, E. Ward Plummer, Changqing Jin, and Rongying Jin

Applied Catalysis A-General | "Methane dehydroaromatization over molybdenum supported on sulfated zirconia catalysts" | Swarom Kanitkar, Md Ashraf Abedin, Srikar Bhattar, and James J. Spivey

Journal of Physical Chemistry C | "Coupling of Acetaldehyde to Crotonaldehyde on CeO<sub>2</sub>-x(111): Bifunctional Mechanism and Role of Oxygen Vacancies" | Chuanlin Zhao, Charles Watt, Paul R. Kent, Steven H. Overbury, David R. Mullins, Florencia C. Calaza, Aditya Savara, and Ye Xu

Molecular Systems Design & Engineering | "Ionic conductivity and counterion condensation in nanoconfined polycation and polyanion brushes prepared from block copolymer templates" | Christopher G. Arges, Ke Li, Le Zhang, Yu Kambe, Guang-Peng Wu, Baraka Lwoya, Julie N.L. Albert, Paul F. Nealey, and Revati Kumar

### March 2019

Physical Review B | "Anomalous magnetic behavior of Ba<sub>2</sub>CoO<sub>4</sub> with isolated CoO<sub>4</sub> tetrahedra" | Qiang Zhang, Guixin Cao, Feng Ye, HuiBo Cao, Masaaki Matsuda, D.A. Tennant, Songxue Chi, S.E. Nagler, William A. Shelton, Rongying Jin, E. Ward Plummer, and Jiandi Zhang

Physical Chemistry Chemical Physics | "Reaction pathways for HCN on transition metal surfaces" | Mohammed Abdel-Rahman, Xu Feng, Mark Muir, Kushal Ghale, Ye Xu, and Michael Trenary

Atmosphere | "Temporal Changes in Air Quality during a Festival Season in Kannur, India" | C.T. Resmi, T. Nishanth, Satheesh M.K. Kumar, M. Balachandramohan, and K. T. Valsaraj

ACS Earth and Space Chemistry | "Chemical Durability and Dissolution Kinetics of Iodoapatite in Aqueous Solutions" | Zelong Zhang, William L. Eber, Tiankai Yao, Jie Lian, K. T. Valsaraj, and Jianwei Wang

Peptide Science | "CPProtectides: Rapid uptake of well-folded beta-hairpin peptides with enhanced resistance to intracellular degradation" | Nora Safa, Jeffery C. Anderson, Manibarathi Vaithiyathan, Jacob H. Pettigrew, Gavin A. Pappas, Dong Liu, Ted J. Gauthier, and Adam T. Melvin

Chemical Engineering Journal | "Study of a toroidal-helical pipe as an innovative static mixer in laminar flows" | Chenguang Zhang, Abigail R. Ferrell, and K. Nandakumar

### February 2019

International Journal of Hydrogen Energy | "Dry reforming of methane with isotopic gas mixture over Ni-based pyrochlore catalyst" | Nitin Kumar, Swarom Kanitkar, Zi Wang, Daniel Haynes, Dushyant Shekhawat, and James J. Spivey

Crystals | "Controlling the Spatial Direction of Hydrothermally Grown Rutile TiO<sub>2</sub> Nanocrystals by the Orientation of Seed Crystals" | Julian Kalb, James A. Dorman, Stephan Siroky, and Lukas Schmidt-Mende

### January 2019

Applied Thermal Engineering | "An environment for topology analysis and data reconciliation of the pre-heat train in an industrial refinery" | Jorge A. Chebeir, Zachary T. Webb, and Jose A. Romagnoli

Soft Matter | "pH-Induced reorientation of cytochrome c on silica nanoparticles" | Jens Meissner, Yao Wu, Jacques Jestin, William A. Shelton, Gerhard H. Findenegg, and Bhuvnesh Bharti

Electrochimica Acta | "Carbonized peat moss electrodes for efficient salinity gradient energy recovery in a capacitive concentration flow cell" | Haihui Zhu, Wangwang Xu, Guangcai Tan, Elizabeth Whiddon, Ying Wang, Christopher G. Arges, and Xiuping Zhu

Nano Letters | "Room-Temperature Strong Coupling of CdSe Nanoplatelets and Plasmonic Hole Arrays" | Jan M. Winkler, Freddy T. Rabouw, Aurelio A. Rossinelli, Sriharsha V. Jayanti, Kevin M. McPeak, David K. Kim, Boris le Feber, Ferry Prins, and David J. Norris

Analytical and Bioanalytical Chemistry | "Luminescent nanomaterials for droplet tracking in a microfluidic trapping array" | Manibarathi Vaithiyathan, Khashayar R. Bajgirani, Pragathi Darapaneni, Nora Safa, James A. Dorman, and Adam T. Melvin

Energy Storage Materials | "Defect engineering activating (Boosting) zinc storage capacity of MoS<sub>2</sub>" | Wangwang Xu, Congli Sun, Kangning Zhao, Xun Cheng, Saurin Rawal, Ye Xu, and Ying Wang

### December 2018

Langmuir | "Magnetic Field-Driven Convection for Directed Surface Patterning of Colloids" | Jin Gyun Lee, Vanel Porter, William A. Shelton, and Bhuvnesh Bharti

ACS Applied Materials & Interfaces | "Binding of Lignin Nanoparticles at Oil-Water Interfaces: An Ecofriendly Alternative to Oil Spill Recovery" | Jin Gyun Lee, Luke L. Larive, K. T. Valsaraj, and Bhuvnesh Bharti

Catalysts | "Catalytic Pyrolysis of Biomass and Polymer Wastes" | Laibao Zhang, Zhenghong Bao, Shunxiang Xia, Qiang Lu, and Keisha B. Walters

Journal of Catalysis | "Steam-assisted crystallized Fe-ZSM-5 materials and their unprecedented activity in benzene hydroxylation to phenol using hydrogen peroxide" | Meysam Shahami, Kerry M. Dooley, and Daniel F. Shantz

Journal of CO<sub>2</sub> Utilization | "Cyanobacteria as photoautotrophic biofactories of high-value chemicals" | Daniel Norena-Caro and Michael G. Benton

## November 2018

Chemcatcher | "Low Temperature Direct Conversion of Methane using a Solid Superacid" | Swarom Kanitkar, James H. Carter, Graham J. Hutchings, Kunlun Ding, and James J. Spivey

ACS Sustainable Chemistry & Engineering | "Low-Resistant Ion-Exchange Membranes for Energy Efficient Membrane Capacitive Deionization" | Varada Menon Palakkal, Juan E. Rubio, Yupo J. Lin, and Christopher G. Arges

## October 2018

Journal of Physical Chemistry C | "Weak Field Tuning of Transition-Metal Dopant Hybridization in Solid Hosts" | Pragathi Darapaneni, Orhan Kizilkaya, Zhen Wang, and James A. Dorman

## September 2018

Macromolecules | "The Solvent Distribution Effect on the Self-Assembly of Symmetric Triblock Copolymers during Solvent Vapor Annealing" | Shisheng Xiong, Dongxue Li, Su-Mi Hur, Gordon S. W. Craig, Christopher G. Arges, Xin-Ping Qu, and Paul F. Nealey

Biomechanics | "Biophysical analysis of fluid shear stress induced cellular deformation in a microfluidic device" | Grant M. Landwehr, Andrew J. Kristof, Sharif M. Rahman, Jacob H. Pettigrew, Rachael Coates, Joseph B. Balhoff, Ursula L. Triantafyllu, Yonghyun Kim, and Adam T. Melvin

International Journal of Molecular Sciences | "Microfluidic and Paper-Based Devices for Disease Detection and Diagnostic Research" | Joshua M. Campbell, Joseph B. Balhoff, Grant M. Landwehr, Sharif M. Rahman, Manibarathi Vaithyanathan, and Adam T. Melvin

Science of the Total Environment | "Monocyclic aromatic hydrocarbons production from catalytic cracking of pine wood-derived pyrolytic vapors over Ce-Mo<sub>2</sub>N/HZSM-5 catalyst" | Qiang Lu, Haoqiang Guo, Min-xing Zhou, Zhen-xi Zhang, Min-shu Cui, Yuan-yuan Zhang, Yong-ping Yang, and Lai-bao Zhang

## August 2018

Catalysis Today | "Theoretical investigation of dephosphorylation of phosphate monoesters on CeO<sub>2</sub>(111)" | Chuanlin Zhao and Ye Xu

Biomedical Microdevices | "A microfluidic device for motility and osmolality analysis of zebrafish sperm" | Jacob Beckham, Faiz Alam, Victor Omojola, Thomas Scherr, Amy Guitreau, Adam T. Melvin, Daniel S. Park, Jin-Woo Choi, Terrence R. Tiersch, and W. Todd Monroe

ACS Macro Letters | "Elucidating the Impact of Molecular Structure on the F-19 NMR Dynamics and MRI Performance of Fluorinated Oligomers" | Cheng Zhang, Dong Sub Kim, Jimmy Lawrence, Craig J. Hawker, and Andrew K. Whittaker

Catalysis Today | "C1 Catalysis Symposium" | Kunlun Ding, James J. Spivey, Nitin Kumar, and Zi Wang

# NEW SPONSORED RESEARCH AWARDS

## June 2019

American Chemical Society Petroleum Research Fund | "Understanding the Effect of Nanoconfinement on the Assembly and Temperature Induced Demixing of Surfactants" | Bhuvnesh Bharti (PI)

LA Board of Regents | "Computational Investigation of Transition Metal Sulfides for Overcoming the Challenges of Electrocatalytic CO<sub>2</sub> Reduction" | Craig Plaisance (PI)

LA Board of Regents | "Enhancing the Capabilities of the Shared Laboratory for Macro - and Bio- Macromolecular Research (SLMBR)" | Mario Rivera (PI), Christopher G. Arges (Co-PI), Rafael Cueto (Co-PI), Jeonghoon Lee (Co-PI), Gerald J. Schneider (Co-PI), David Vinyard (Co-PI), and Donghui Zhang (Co-PI)

LA Board of Regents | "Electrochemical Reactor for Upgrading Low Molecular Weight Alkanes" | Christopher G. Arges (PI)

LA Board of Regents | "Thiol Acrylate-Based Materials for 3D Cell Culturing in a Microfluidic Device" | Adam T. Melvin (PI)

## May 2019

National Science Foundation (NSF) | "REU Site: Developing entrepreneurs in energy storage, catalysis, and biofuels" | Michael G. Benton (PI) and Adam T. Melvin (Co-PI)

## April 2019

National Science Foundation (NSF) | "CAREER: Degron-based substrates: A novel toolkit for biosensing and targeted inhibition" | Adam T. Melvin (PI)

## March 2019

Argonne National Laboratory | "Resin-wafers with mosaic ion-exchange resins for electrodeionization and membrane capacitive deionization" | Christopher G. Arges (PI)

## February 2019

Pennsylvania State University | "Conversion of CO<sub>2</sub> to High-Value Chemical Intermediates: Vinyl Acetate" | James J. Spivey (PI), Kunlun Ding (Co-PI), and Ye Xu (Co-PI)

## January 2019

Argonne National Laboratory - USDOE | "Resin-wafers with mosaic ion-exchange resins for electrodeionization and membrane capacitive deionization" | Christopher G. Arges (PI)

Dept of Energy - DOE | "Bandgap Tunable Perovskite Detectors for Low-Mass Dark Matter Experiments" | Manas Ranjan Gartia (PI), Kevin M. McPeak (Co-PI), James A. Dorman (Co-PI), and Fengyuan Lu (Co-PI)

The Electrochemical Society (ECS) | "Probing ionomer-catalyst interactions above 100 C and anhydrous conditions through the principles of directed self-assembly" | Christopher G. Arges (PI)

## December 2018

US Department of Energy (DOE) | "Understanding and Manipulating Counterion Condensation within Charged Polymer Electrolytes for Selective and Low Resistant Membrane Separations" | Christopher G. Arges (PI)

## October 2018

LSU Board of Supervisors | "Lignin nanoparticles as an ecofriendly and cost-effective alternative for oil spill recovery" | Bhuvnesh Bharti (PI)

## September 2018

National Science Foundation (NSF) | "Understanding Reaction Mechanisms for the Design of RF Driven Catalytic Modular Reactors" | James A. Dorman (PI) and Kerry M. Dooley (Co-PI)

NIH-National Institute of General Medical Sciences (NIGMS)/Pennington Biomedical Research Center | "Selective knockdown of PTP1B by peptide-directed proteasomal degradation" | Adam T. Melvin (PI)

## SPOTLIGHT | *Professor Kerry Dooley*



### Dooley Celebrates 35 Years at LSU

For the past 35 years, Dooley has offered his students an array of knowledge, as well as sound advice on how to earn an engineering degree and make it in the working world.

Just don't ask him when he plans to retire.

Born and raised in the Carrollton area of New Orleans, Dooley attended Jesuit High School, where he enjoyed math and chemistry classes. Though he initially pondered going to law school like many of his peers, Dooley thought he would give engineering a shot.

"My senior year, I asked my calculus and physics teacher if I could make it as an engineer, and he laughed and said, 'Of course you can make it,'" Dooley said. "No one was really going into engineering back then. Everyone wanted to be a lawyer or doctor."

Dooley enrolled in engineering at Tulane University and recalls talking to a few seniors who told him he was making a big mistake.

"They said there are no engineering jobs and that it was a dead-end profession," Dooley said. "This was right when the energy crisis was hitting. That's what the conventional thinking was when I went into engineering, but when I came out, it was hot. Everyone in my class was fighting off offers."

After receiving his bachelor's in chemical engineering from Tulane in 1976, Dooley worked at DuPont in LaPlace, Louisiana, for a couple of years as the "typical grunt process engineer," dealing with neoprene polymers, which, he points out, is how the soles of shoes are made.

Dooley then earned his coursework master's from Tulane in 1978 before leaving for the University of Delaware, where he spent the next four years conducting polymer research and working toward his PhD.

"In those days, DuPont and Delaware were almost synonymous," Dooley said. "DuPont had several people in research who worked at the Experimental Station [in Wilmington, Delaware]."

Dooley had planned to find a job up north after earning his PhD in 1983, but fate would intervene.

"We were in a recession at the time and it hadn't yet hit the south or west," Dooley said. "So, that's where I interviewed, and LSU was aggressively recruiting."

It wasn't just the allure of being closer to his family that brought Dooley to Baton Rouge; LSU College of Engineering Dean Ed McLaughlin sold him on LSU.

“Ed was a good salesman,” Dooley said. “All the other places I interviewed, there was something that didn’t seem right.”

Dooley started off teaching reactor design at LSU and has since gone on to teach “most of the stuff” in the ChE undergraduate and graduate curriculum, including junior and senior lab, fluid mechanics, and unit operations (now Design 1).

Over the years, he has tried to help students understand that engineering, particularly chemical, is not easy and that’s normal.

**“Unfortunately, many have the tendency to give up. You can’t give up. Students think that professors didn’t have to struggle when we were students; that it was all easy for us. Nothing is further from the truth. All of engineering is a struggle. I can remember my organic chemistry class and getting a 38 on a test, a real F. I was crushed. I thought, I’m never going to get out of here with a degree.”**

**KERRY DOOLEY**

**BASF Professor**

**Dr. Paul Horton Memorial Professor**

Dooley is a firm believer in practice makes perfect, or nearly perfect.

“It doesn’t sound appealing to the students to work problems and read the book, but that’s how everyone learns in engineering,” he said. “I like to use a football analogy. If you refuse to scrimmage, run laps, or hit the tackling dummies, you’re going to be flattened when game-time rolls around. A lot of students want to watch the coach’s film but this doesn’t get you ready for the game. Engineering is very experiential. You have to practice it.”

The most important advice Dooley gives his incoming students is to hit the ground running, don’t lose your scholarships, don’t wait until the end of the semester to get help, and make sure you actually like engineering.

“The faculty will try to help you,” he said. “I don’t know of any ChemE faculty member who would not help a student with a problem. They’re not going to give you a miracle answer most of the time, but they will help get you started. Also, you’re going to be in engineering for the rest of your professional life, so you better like it. How can you find out if you really like engineering? I think the course that tells you the most is the first physics class.”

Dooley admits he never thought he would be at LSU this long. If it weren’t for Hurricane Katrina in 2005, he may not still be here.

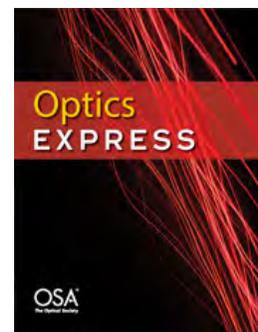
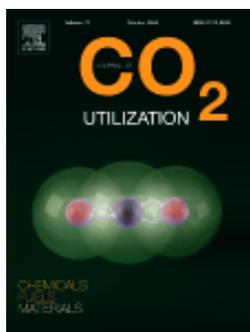
“I was about to leave Louisiana, but my mom lost her house in Lakeview—17 feet of water to the attic,” he said. “So, I brought her to Baton Rouge to live with me. It wouldn’t have been right to move her out of the state.”

Thanks to Mother Nature’s intervention, Dooley has remained at LSU, where he continues to teach students and work alongside ChE assistant professors like James Dorman, who is working with Dooley on an NSF project.

“The assistant professors we have are top-notch,” Dooley said. “They really don’t get enough credit.”

As for when he plans to retire, Dooley laughs and says, “I was going to retire in May if I didn’t bring in any more money, but I brought in more money. When I do retire, I’m going to do what my dad did, which is do all the stuff I didn’t get to do while working. I’ll keep busy somehow. I may even still teach.”

Dooley’s reluctance to leave the job he has been so passionate about for the past three decades is LSU’s gain.



## FEATURED ARTICLES, PUBLICATIONS & RESEARCH NEWS

### Science

Kunlun Ding recently published an article entitled "A General Synthesis Approach for Supported Bimetallic Nanoparticles Via Surface Inorganometallic Chemistry." The article was published in *Science*, with most of the work being done at LSU. *Science* is typically regarded as "the premier" journal in our field. It has an impact factor over 40. Our faculty have published in this journal before, mostly as co-authors, but this is the first time in recent memory where one of our faculty members was the lead author.

### Optics Express

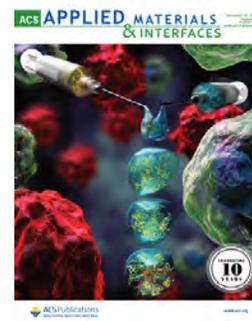
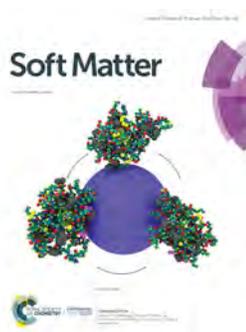
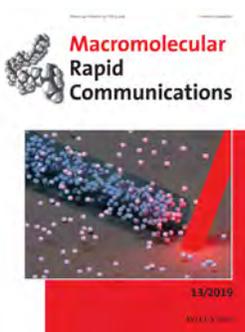
Kevin McPeak recently published an article in *Optics Express*, titled "Correlation of Circular Differential Optical Absorption with Geometric Chirality in Plasmonic Meta-atoms." Notably, the first author is an LSU undergraduate alumnus, Jon Wilson. Wilson is currently at the University of Delaware pursuing his PhD in chemical engineering.

### ACS Sustainable Chemistry & Engineering

Varada Menon Palakkal (PhD candidate), Juan Rubio (BS 2018), and Chris Arges published a research article in *ACS Sustainable Chemistry and Engineering*, entitled "Low Resistant Ion-exchange Membranes for Energy Efficient Membrane Capacitive Deionization." This paper correlates ion-exchange membrane resistance values to the energy efficiency of membrane capacitive deionization (MCDI)—an electrosorption technology used in ionic separations. MCDI has emerged as an energy efficient technology for brackish water desalination and is important in industrial water reclamation. The study showed that a 5- to 10-fold reduction in area-specific resistance of the ion-exchange membranes, achieved through new polymer membrane chemistries, only translated to a 50% reduction in energy expended per ion removed—still a laudable outcome. The discrepancy between the 5- to 10-fold reduction resistance and a 2-fold improvement in energy efficiency of the MCDI cell was investigated using electrochemical impedance spectroscopy. Fitting of impedance data to a transmission line equivalent circuit model revealed that spacer channel resistance dominated the cell efficiency when membrane resistances have been minimized and the spacer channel resistance hindered further energy efficiency improvement in MCDI. These results motivate future studies by Palakkal and Arges to address spacer channel resistances in MCDI.

### Macromolecular Rapid Communications

Yusheng Guo (PhD candidate), Jorge A. Belgodere, Yingzhen Ma (PhD candidate), Jangwook P. Jung, and Bhuvnesh Bharti were recently published in *Macromolecular Rapid Communications*. Their article, entitled "Directed Printing and Reconfiguration of Thermoresponsive Silica-pNIPAM Nanocomposites," was selected for the coveted space of front cover.



## The Journal of CO<sub>2</sub> Utilization

Mike Benton and Daniel Caro (PhD candidate) recently published an article, entitled "Cyanobacteria as Photoautotrophic Biofactories of High-value Chemicals," in the *Journal of CO<sub>2</sub> Utilization*. This article represents years of hard work and dedication.

## ACS Applied Materials & Interfaces

Jin Gyun Lee (PhD candidate), Luke Larive (BS 2019), Kalliat T. Valsaraj, and Bhuvnesh Bharti have been at work researching and formulating an ecofriendly alternative to oil spill recovery—and they may have created it. Their article, entitled "Binding of Lignin Nanoparticles at Oil-Water Interfaces: An Ecofriendly Alternative to Oil Spill Recovery," was published in *ACS Applied Materials & Interfaces*.

## Soft Matter

Bhuvnesh Bharti and William Shelton recently published an article, entitled "pH-Induced Reorientation of Cytochrome C on Silica Nanoparticles," which was selected and given the inside cover of *Soft Matter*.

## Atmosphere

K. T. Valsaraj recently published an article in *Atmosphere*, an international peer-reviewed open access journal of scientific studies related to the atmosphere. His article, titled "Temporal Changes in Air Quality During a Festival Season in Kannur, India," looked at the variation in air quality during the periods of fireworks as assessed from the change in ambient concentrations of air pollutants like particulate matter (PM<sub>10</sub>), O<sub>3</sub>, and NO<sub>2</sub> for pre-, post-, and Vishu days for four consecutive years in 2015, 2016, 2017, and 2018 in Kannur, India.

## Chemical Processing

Jerry Forest was recently published in *Chemical Processing*. His article, "Prevent the Illusion of Protection," addresses management system failings that undermine process safety.

## Macromolecules

Dr. Brian Hanley, professional in residence, recently published an article in *Macromolecules*, entitled "Reconsidering the Analysis of Refractive-Index-Matched Polymer/Polymer/Solvent Tracer Diffusion Experiments."

## Process Safety Progress

Jerry Forest published two research articles in *Process Safety Progress*. "Know Your Limits" and "Don't Walk the Line—Dance It!"

## Nature Communications

Bhuvnesh Bharti's article, "Directed Propulsion of Spherical Particles Along Three-Dimensional Helical Trajectories," was published in *Nature Communications* and seeks to answer the question of how to program the propulsion of artificial synthetic objects on a microscale.

The article was co-authored by William Shelton, Jin Gyun Lee (PhD candidate), Pennsylvania State University chemical engineering graduate student Allan Brooks, and Columbia University Associate Professor of Chemical Engineering Kyle Bishop. It will provide a new physical principle of designing next-generation microbots.

Their study is a step towards designing new autonomous microscale vehicles, which can perform complex functions necessary for advanced biomedical procedures, including non-invasive surgery.

The work was supported by the US Department of Energy, with additional support from the Louisiana Board of Regents and the National Science Foundation.

"Inspiration for this work comes from the lack of ability to control motion of objects that are 1/100 the diameter of a human hair," Bharti said. "The physics at this scale are very complex, and particles swimming in water at this microscale are equivalent to a human swimming in honey. Currently, we lack a facile tool to engineer surface forces on such particles that allow us to control the motion of micromachines at a microscale."

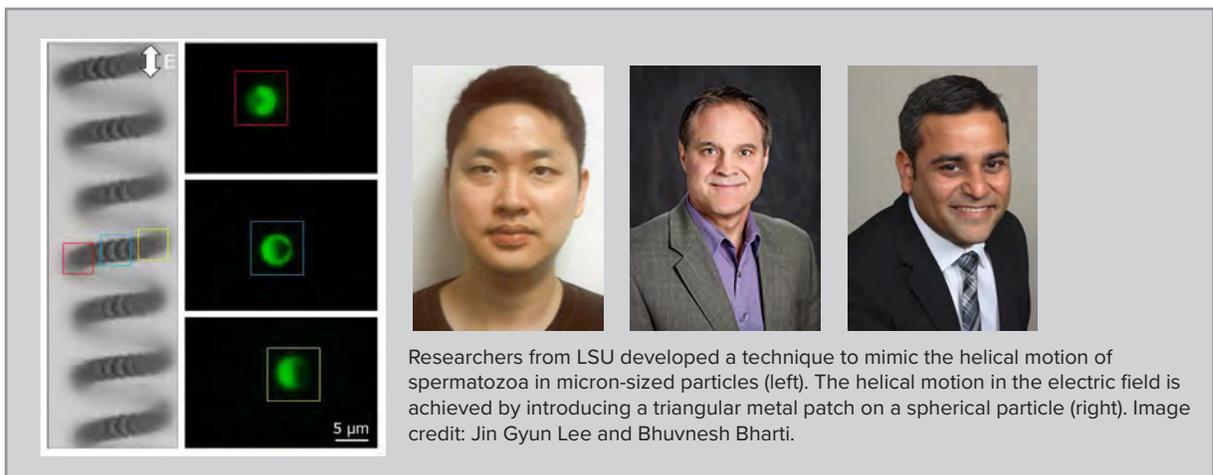
"My Roomba vacuum cleaner has an on-board computer that instructs how it should move in response to environmental cues," Bishop said. "For colloidal microrobots, we do not have the luxury of powerful computers and general-purpose software. Instead, we have to encode these rather primitive 'programs' more directly into the particle itself."

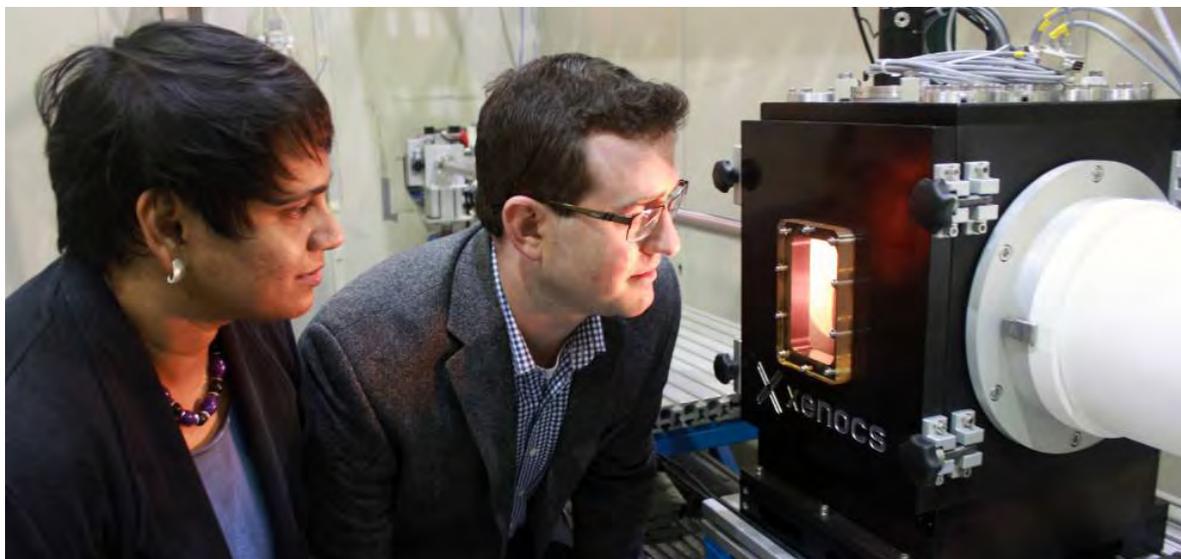
"We add a metal patch to the spherical particle in order to instruct it how to move in the electric field. We use the shape of the metal patch as a primitive encoding medium—different patch shapes encode different motions in the field. This paper shows that the geometry of the metal patch can be a useful encoding medium for programming different types of complex motions in self-propelled colloids."

One of the key aspects of the group's research is the demonstration of the principle that a helically moving microsphere is more effective in navigating complex environments that contain several objects floating in their vicinity.

"A good analogy of this principle is...suppose you would like to cross a crowded street," Bharti said. "If you try and run in a straight line, you may not get very far. However, if you are moving in a zigzag or curvilinear path, you may get much farther away and may even be able to cross the street."

*Nature Communications* is an open-access journal that publishes high-quality research from all areas of the natural sciences. Papers published by the journal represent important advances of significance to specialists within each field.





### Separation Anxiety? Not Anymore.

Chris Arges and Revati Kumar (LSU Chemistry assistant professor) were recently awarded a three-year, \$500,000 grant for their project, “Understanding and Manipulating Counterion Condensation with Charged Polymer Electrolytes for Selective and Low-Resistant Membrane Separations.”

The project, which is funded by the Department of Energy’s Separations Science Program, will ultimately help realize the guiding principles for designing low-resistant membranes for ionic separations. These membranes are vital to the desalination, or removing salts and minerals from a target substance, of municipal and industrial water streams, in addition to removing nitrates, heavy metals, and charged pesticides and pharmaceuticals from ground water.

“Forty to 70% of operating and capital costs of chemical processes in a plant are related to separations,” Arges said. “There is a big incentive to lower the costs and energy associated with separations.”

Upon arriving at LSU in early 2016, Arges aimed to develop a project on investigating counterion condensation in membrane separators, but concluded that he didn’t think these kinds of experiments could be done effectively in solid-state membranes. With the acknowledgment that working on such a project would be a complex and challenging task, Arges saw that working with someone with a different skill set, such as Kumar, would be beneficial.

“Her molecular simulations have the ability to peek inside the nano-confined charged domains to see how condensed and non-condensed ions transport,” Arges said. “This is a great example of two departments and colleges working together and complementing their unique skill sets.”

“I contribute toward the theory and simulation, while Chris handles the experimental side,” Kumar said.

The project investigates counterion condensation phenomena in model polymer systems and correlates it to bulk ionic charge transport and selectivity. Using the principles of directed self-assembly, the model systems are

precisely defined at the molecular level and have long-range order and are free of structural defects. This is important because defects obfuscate correlations between ionic transport and counterion condensation.

The central premise of the work is that condensed counterions in the membrane migrate slower under applied electric fields, and the condensed ions aid unwanted co-ion adsorption, which compromises the selectivity of the membrane.

“Directed self-assembly of block copolymers has been primarily targeted for making the next generation of faster computer chips in your phones and computers,” Arges said. “What we’re doing now is adopting these cutting-edge techniques to understand charge transport in electrochemical materials found in batteries, fuel cells, and electrochemical separation units.”

To make the project successful, Arges and Kumar will rely heavily on the unique research capabilities and infrastructure at LSU. These facilities include LSU’s Synchrotron Radiation Research Center in the Center for Advanced Microstructures and Devices (CAMD), where Small-Angle X-ray Scattering (SAXS) studies reveal the microstructure of the precisely defined model systems. Their project will also leverage LSU’s Supercomputer, SuperMike II, which is managed by LSU’s High-Performance Computing Center.

“Most universities cannot boast that they have both a synchrotron facility for sophisticated X-ray experiments studies, in addition to having extremely fast supercomputers,” Kumar said.

Arges and Kumar recently submitted a manuscript on their results and were surprised to learn the influence that water has on counterion condensation. These results not only provide future research directions that aim to relate the extent of water solvation to the degree of condensed counterions in nano-confined domains, but will also help them understand how water management in membranes impacts desalination rates.



### Radio Frequency Energy Heats Up Interest in Low-temperature Nanocatalysts by Paul Boisvert

Worldwide, the chemical industry uses catalysts—substances that facilitate chemical reactions—in about 90% of all chemical manufacturing processes as a means of optimizing energy use and reducing greenhouse gas emissions. The sheer scope of the catalysis sector suggests that any reductions in energy consumption for certain chemical processes could have substantial economic and environmental impacts.

Scientists from LSU are using neutrons at Oak Ridge National Laboratory (ORNL) to study the effects of employing an alternating electromagnetic field to produce low-temperature catalytic reactions by heating iron oxide nanoparticles with hydrocarbon molecules attached to the nanoparticle surface. The researchers used a radio frequency (RF) generator to stimulate the nanoparticles, transferring the generated heat to the individual hydrocarbon molecules and restructuring their chemical bonds to produce value-added products.

"We want to significantly reduce energy consumption and increase catalytic reaction efficiencies by isolating heat generation to the location of the molecule, instead of heating entire reactors to extremely high temperatures," said [James Dorman](#). "Lowering overall process temperatures during catalysis also reduces the formation of coke and unwanted by-products, such as greenhouse gas emissions."

The team exposed its samples to an RF field in a laboratory chamber, immersed them afterward in liquid nitrogen to freeze everything in place, and then observed the results using neutron-based vibrational spectroscopy at the VISION beamline located at ORNL's Spallation Neutron Source. Neutron scattering combined with vibrational spectroscopy is an ideal method to study energy transfer across inorganic-organic interfaces.

LSU researchers are currently developing advanced methods of synthesizing iron oxide nanoparticles and modifying their shape to control a sample's surface sites involved in adsorption and surface reactions. Various particle morphologies, including spheres, cubes, and hexagons, can be produced to optimize their use in different catalytic applications.

"One of our biggest challenges is to control the process of synthesizing nanoparticles and optimizing their morphology at the same time," said Dorman group member [Natalia da Silva Moura](#) (PhD candidate). "The neutron data enables us to see how each shape interacts with our target molecules and then improve the design to maximize the efficiency of the localized heating and reactions."

Part of the experiment includes pulsing the RF field to limit the reaction and prevent the formation of coke on the surface. Of particular interest is the amount of energy transfer caused during heating as a function of the magnetic field's frequency and strength. Once this relationship is understood, the scientists plan to develop new catalysts to drive reactions down alternative pathways that increase selectivity and yield without the need to apply high temperatures, which will help meet a US Department of Energy (DoE) goal for increased energy efficiency in US industry.

The research was supported by the National Science Foundation and the Louisiana Consortium for Neutron Scattering via a grant from the DoE EPSCoR program.

The Spallation Neutron Source is a DoE Office of Science User Facility. UT-Battelle LLC manages ORNL for DoE's Office of Science. The Office of Science is the single largest supporter of basic research in the physical sciences in the United States and is working to address some of the most pressing challenges of our time.

## Breaking the Bond: Chris Arges Creates Reactor-Separator to Upgrade Methane

A century ago, natural gas was not the hot commodity it is today. A byproduct of oil production, or fracking, natural gas is now abundant and low-cost, resulting in its high demand for energy production. The gas not only powers homes and cars, but the hydrocarbons that make up the gas, such as methane, can be converted and used for creating other products like fuel and plastic. The trick is separating, or breaking, the bond between carbon and hydrogen to make methane consumable. For the past year, **Chris Arges** has undertaken that very task.

“The emergence of low-cost natural gas has motivated many scientists and engineers to devise new processes to convert natural gas into high-value chemicals, rather than just burning it to power homes and vehicles, its lowest value,” Arges said. “The reason we’re working on this is so we come up with a new way to convert natural gas, which is mainly composed of methane, into other products such as liquid fuels like gas or jet fuel, or—more importantly—other chemicals that can be used to make plastics and other consumable products that are found everywhere. It’s a very difficult proposition. The C-H bond in methane is hard to break.”

Currently, plants and companies upgrade methane through a process called steam reforming, followed by the Fischer-Tropsch process, which is energy-intensive and cost-prohibitive.

“There are only six gas-to-liquid (GTL) plants worldwide, none of which are in the US because it doesn’t financially make sense,” Arges said. “Part of the reason why is you need a lot of energy to run that process. If you come up with a smaller, more modular technology that’s more effective, it’s very transformative. You can develop these plants in more diverse geographical locations, besides the fact that it would also cost less to make jet fuel, gas, and the building blocks for plastics and a variety of other chemicals.”

Thanks to a \$50,000 LSU LIFT2 grant, Arges and his team have been developing a reactor-separator that can upgrade methane into higher-order carbons which can be used to make consumable products while simultaneously producing hydrogen.

“John Flake encouraged me to look at methane upgrading as a research topic from an electrochemistry perspective,” Arges said. “Almost no one has been looking at this route. By employing an electrochemical reactor, which is what we’re doing versus high-temperature reactors, you really have two driving forces at your disposal—heat and electrode potential. When you combine those two, you can be a lot more effective.”

“We have shown in three-cell electrode setups that the electrochemical process works to convert methane to ethylene, but it isn’t conducive for a production scale. The LSU LIFT2 grant allows us to redesign the electrochemical reactor using all solid-state materials with gas feeds. This design is modular and scalable. A surprising by-product of the reactor is also hydrogen, and the reactor separates the hydrogen from the upgraded methane products—an example of process intensification.”

The reactor, which Arges normally uses to run fuel cell experiments, has been outfitted to convert methane into ethane, ethylene, and other large alkane/alkene molecules. To get the process to work, the reactor must be dry and operate above 100°C.

“If you run these fuel cells north of 100°C, the conventional fuel cell membranes used to help carry out the reactions cannot be used,” Arges said. “We had to develop a new class of proton-conducting membranes that conduct above 100°C and under dry conditions, while also being resilient to the harsh reactor conditions.”

Though Arges has expertise in polymer membranes for electrochemical systems and has applied his membranes to water desalination, fuel cells, and flow batteries, this is the first time he has tailored this class of membranes to conduct under dry conditions and at temperatures greater than 100°C. The new set of membranes invented by Arges’ team also has utility for other technologies being researched at LSU.

“We’re working with other people, like Manas Gartia [LSU Mechanical Engineering assistant professor], who works on supercapacitor devices,” Arges said. “The membranes will help the supercapacitors, which are fast charging-discharging batteries, to run more effectively. Our membranes’ solid-state, flexible design will help realize smaller and flexible portable electronic devices.”

From a commercial standpoint, Arges and his team are working to improve the proof of concept. He currently has a provisional patent on the project, with plans to establish a final patent in spring 2019. In the meantime, he and his team are focused on showing how well the reactor-separator performs.

“We know that it works in the three-electrode cell setup,” he said. “Our design is modular technology that’s scalable. That’s what I think our customers, or people who understand what we’re doing, would appreciate. If you can reduce the energy amount by half to convert methane, or even ethane, to useful products, which we think we’ll be able to do, that translates into \$50 billion saved in operating costs per year globally.”

As for a completion date on the project, Arges does not want to set anything in stone.

“There’s a tall order here,” he said. “Many smart people have been trying to find ways to upgrade methane for a long time. Even if everything does not pan out, we think the reactor design and the new materials being developed will be useful for other things. That’s the one thing I’ve learned in my short career. Maybe you won’t reach your final goal, but you’ll probably make some other discoveries along the way that will be useful.”





## RESEARCH EXPERIENCES FOR UNDERGRADUATES (REU)

### Developing Entrepreneurs in Energy Storage, Catalysis, and Biofuels

This summer, the Cain Department of Chemical Engineering hosted 10 students for the fourth year of an REU program entitled “Developing Entrepreneurs in Energy Storage, Catalysis, and Biofuels” run by Mike Benton and Adam Melvin. The 10-week program gave students from across the country a chance to perform graduate-level research under the direction of professors in the department. Students were also given instruction in entrepreneurship and how research and new ideas could translate to new products, startup companies, and collaboration with industry. They received training from staff at the Louisiana Business & Technology Center and the Office of Innovation & Technology Commercialization. Additional activities included weekly seminars, a trip to New Orleans, a swamp tour on Lake Martin, and a cookout hosted by the department. The summer ended with a poster competition, where the students presented their research and its entrepreneurial potential to a panel of 20 LSU faculty and staff members. Jacy Busboom took first place in the competition and will be sent to the AIChE Annual Student Conference this fall in Orlando, Florida, to present her research.



The student participants were:

#### Elizabeth Amedee

Louisiana Tech University  
Mentor: Kevin McPeak

#### Margaret McGovern

University of Idaho  
Mentor: Craig Plaisance

#### Jacy Busboom

University of Wyoming  
Mentor: Adam Melvin

#### Jameson Orvis

Georgia Tech University  
Mentor: Adam Melvin

#### Lucas Condes

University of Oklahoma  
Mentor: Jimmy Lawrence

#### Maisie Pelafigue

McNeese State University  
Mentor: Kerry Dooley

#### Tyrese Fajardo

Ohio State University  
Mentor: Mike Benton

#### Kiarra Richardson

University of New Haven  
Mentor: Elizabeth Martin (BAE)

#### Kennedy Guillot

University of Louisiana-Lafayette  
Mentor: Mike Benton

#### Lauren Spahn

Michigan Tech University  
Mentor: Bhuvnesh Bharti

## ANOTHER TRIP AROUND THE SUN

### ChE Emeritus Professors Celebrate Birthdays

On Wednesday, October 24, 2018, the department celebrated the birthdays of three of our esteemed emeritus professors: David Wetzel, Art Sterling, and Edward McLaughlin.

Wetzel celebrated his 80th birthday in 2018. He began his illustrious career at LSU in 1979 and retired in 2016. His retirement came after more than 40 years in academia, including the last 36 in our department. He taught more than 3,000 students and graded over 30,000 exams in his 40-year career. More than these numbers, he made a meaningful and positive impact in the lives of our students. The kind words of two of his former students sum up his impact best.

Bob Spurr, former student of Wetzel's, recounts an evening back in 1978, when he was a student at Catholic University, that shows just how much he cares about his students. "One weekend in [Washington], DC, a snow storm hit—dropping a few inches of snow—which literally shutdown DC, resulting in no food service at Catholic U. As we frequently contacted Dave by phone, we mentioned this to him. His response was 'Why don't you all come over to my house and I'll cook breakfast for you.' We did so and had a great time. How many college professors would volunteer for that?"

Another of his former students from Catholic University, Jaime Jurado, said, "I still have a clear memory of David's first lecture in that 1978 semester and his rote explanation of his syllabus and his patience as we progressed through the chapters...with me specifically on interpreting phase diagrams and on the differential equations solution to the brine mixing tank problems."

Sterling also celebrated his 80th birthday in 2018. He came to LSU in 1975 and had a long and prosperous career, retiring in 2003. During his tenure at LSU, he served our students, colleagues, department, and college with grace and devotion. He was an associate dean for the College of Engineering from 1989-95. He also took on the role of chair for our department on two separate occasions, from 1987-88 and 1995-97. The following birthday wish from Beverly Mentzer exemplifies the impact he had on his students' lives.

"It's great to be able to wish you happy birthday 39 years after my graduation!!! You were a super professor and advisor and I've always appreciated how helpful and friendly you were to me at LSU, while providing much-needed guidance! I remember that my electives were often a topic of discussion. When I decided to take shorthand, so that I could earn another 25 cents/hr in my summer secretarial job, you were flabbergasted! You were very supportive when I took three petroleum engineering courses as electives. I later had two internships...one with Exxon and one with Mobil.

"My career was very fulfilling. I had 16 different assignments in 33 years with ExxonMobil—in Upstream Research, Production & Pipeline. I traveled the world, met my husband at work, raised two children, and served in two VP positions.

"As part of our 'retirement gig,' I am now at Purdue University in the fall semesters. My husband is a visiting professor in

ChE, and I work as an industrial career counselor—helping students get jobs. So, I'm one of their advisors now, like you were for me! After the corporate world, I love the one-on-one engagement with the students. I say that it's like talking to my kids, but the students really want to know what I have to say!"

McLaughlin celebrated his 90th birthday in 2018. He came to LSU on sabbatical leave in 1967 at the behest of Jesse Coates. Three years later, in 1970, he joined the LSU faculty as a professor in the chemical engineering department. He served as the chair of the department from 1979-87. In May 1987, McLaughlin became the dean of the College of Engineering, a role he carried with pride and dedication for 10 years, retiring as dean in 1997. He was elected into the CoE Hall of Distinction in 2002. His experience at LSU was summarized in his reflections.

"While on a visit to London, Jesse Coates persuaded me to come to LSU for sabbatical leave from my university—Imperial College. LSU in 1967 was a very different place than it is now. The Tiger Train, consisting of open wagons with side bench seats and brightly colored canvas tops, was pulled by a farm tractor. You could hop on and off, even between the official stops, if you were nimble enough. I'm not sure that today's buses are an improvement for campus transportation. The offices in chemical engineering in many cases were not air-conditioned, which made summers pretty tough going. In the department, the machine shop superintendent, Larry Veilleux, performed daily miracles with equipment that, to say kindly, had seen better days. That did not seem to adversely impact the students, however.

"I don't remember who told me, but he said that the best recruiting tool to bring students to college was the prospect of spending a good part of life looking at the rear end of a mule. If you look at the achievements of the LSU Engineering students in industry or academia, you are impressed by their quality and the positions they occupy. In fact, this was the motivation that drove me, in later years, to recognize their successes and, of course, to seek their support both financially and on advisory committees. Eventually, I pushed this activity to such a level that at a birthday party held for me by a well-known lady, Mildred Voorhies, wife of one of our distinguished professors, Alex Voorhies, I received as a gag gift, a church collection plate with a red baize lining. In response to my surprise, she said that I was such an efficient beggar there was no doubt the gift was appropriate, and she was sure I could put it to good use. Naturally, I did by eventually placing it at the entrance to my office and encouraging faculty to deposit their loose change from their foreign trips. I now have a significant collection of foreign coins!

"What impressed me most on our first visit to LSU was the friendliness of the faculty and the easy relationship of faculty to students. The engineering students, in general, were always motivated and a pleasure to teach. Women students in the early days were a scarce commodity in the classes, but their numbers have increased dramatically over the years. In fact, I was motivated to find out in later years who the first woman to graduate in engineering was. She is a delightful lady known as Gail Wilbur who graduated in 1937, and she is still alive, living in Shreveport, known as Gail Wilbur Baker. Some things I have failed to succeed at. Probably the one that pains me the most was my inability to find a photograph of the first person to graduate in engineering; that is of Thomas H. Montgomery, who graduated in 1869 and who was also the first graduate of the university.



“Finally, coming from London, I was impressed with the price and availability of farmland and managed to secure a nice hideaway in the Tunica Hills of West Feliciana. You may not be pleased to hear me say that this was a major factor in my staying at LSU, even when distant sirens summoned me elsewhere. LSU and the Tunica Hills are now part of my *raison d’être*, but London and Belfast still hold many fond memories for Aine, my wife, and our children.”

**José Romagnoli Turns 70**

Romagnoli celebrated his 70th birthday in 2018. His current PhD students, Yan Ma and Wenbo Zhu, put a video together to help celebrate the occasion. It was first shown at Romagnoli’s birthday celebration, and students and colleagues from around the world took time to send him well wishes.

*Video contributions were made by Paritosh Sharma (LSU), Bing Zhang (LSU), Rajib Mukherjee (LSU), Daira Aragón (LSU), Nooshin and Amid Bakhtazad (U. Sydney), Joseph Zeaiter (U. Sydney), Ali Abbas (U. Sydney), Chiara and Rob Willis (U. of Cagliari/U. Sydney), Maria Celeste Colantonio (N. U. of the South, Argentina), José Figueroa (N. U. of the South, Argentina), Osvaldo Agamenoni (N. U. of the South, Argentina), and Mabel Sanchez (N. U. of the South, Argentina).*

*Special Guests* |

Duncan Schleiss & Robert Vial



*John Flake, Kerry Dooley, Duncan Schleiss, Robert Vial, and Harry Toups*

**The Changing Role of Automation Systems in Today’s Changing Economic Climate**

Duncan Schleiss, Emerson’s vice president of business development, and Robert Vial, PSF sales director at John H. Carter Company Inc., paused for a moment to document their recent visit, during which they met with

ChE faculty and students. As part of the ChE Seminar Series, Duncan spoke to students on pertinent global trends and how a modern DCS is adjusting accordingly. He shared his experiences on how a modern DCS meets the demand for the business transformation promised by the digital transformation as the harbinger of the future. Also covered was cybersecurity, open versus proprietary technologies, role-centered design, and embedded versus cloud analytics.

## CHE AWARDS CEREMONY



### Dow Excellence in Teaching Award

Adam Melvin received the 2019 Dow Excellence in Teaching Award. Mike Benton and Bhuvnesh Bharti rounded out the top three.

Balloting was conducted earlier in the semester, and all seniors who expected to graduate during the 2018-19 academic year were eligible to vote. Voters were instructed to identify their top three choices from the list of full, associate, and assistant professors. The ballots were then tabulated anonymously and the top three selections in order of overall preference were determined.

At the banquet, hosted by Dow, each finalist was introduced by a student who recounted several of their experiences with the faculty member. The results were then announced, and every finalist was given a trophy to commemorate the event. In addition, Melvin received a monetary award and his name was emblazoned on the plaque memorializing past recipients in the display case outside the Lopez Chemical Engineering Suite in Patrick F. Taylor Hall.

The Excellence in Teaching Award was started in 1988 with financial support from Dow Chemical USA and is intended to recognize the chemical engineering professor graduating seniors consider to be the most outstanding teacher in courses they have taken from the department.

### Chair's Awards

The Chair's Award is given to graduating seniors that complete the program in four years with no dropped courses. This year's recipients were A'mer Abu Shamleh, Brigette Berbling, Emily Bergeron, Joshua Campbell, Josh Florida, Hailey German, Zachery Gordon, Elise Guillory, Sara Guillory, Rathnayaka Gunasingha, Alexis Hanson, Farzan Ikhlas, Joshua Janway, Hailey Kosutic, Jeffrey Millet, Amy Morgan, Blake Ritchie, and Hunter Simonson.

### Junior Awards

A'mer Abu Shamleh, Alexis Hanson, Jeffery Anderson, and Joey Balhoff received 2019 Junior Awards for holding GPAs above 4.0 at the end of the semester in which they had completed 90 hours.



### Jesse Coates Award

[Alexis Hanson](#) was presented with both the 2019 Jesse Coates Award and an engraved watch. The Coates Award is voted on by all department faculty and is given to a student who exemplifies both academic integrity and leadership in extracurricular endeavors.



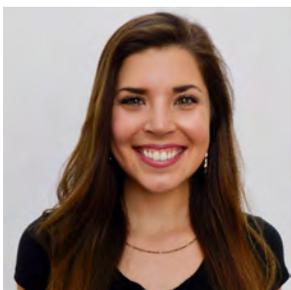
### Wetzel Award

[Ruby Roberg](#) was selected to receive the 2019 Wetzel Award. The honor goes to a sophomore for outstanding scholarship. Ruby received a trophy signifying her achievement. In addition, her name was added to a commemorative plaque honoring recipients of the Wetzel Award located in the display case outside the Lopez Chemical Engineering Suite in Patrick F. Taylor Hall.



### American Institute of Chemists Award

The American Institute of Chemists Award is given to a student that exemplifies outstanding scholastic achievement, leadership, ability, and character. [Joey Balhoff](#) was 2019's recipient of this prestigious award.



### American Institute of Chemical Engineers LSU Student Chapter Senior Award

The American Institute of Chemical Engineers (AIChE) LSU Student Chapter Senior Award is given to the graduating senior with the highest GPA in her/his class. This year's recipient was [Alexis Hanson](#).



### Most Outstanding TA Awards

[Amber Pete](#) (Advisor: Mike Benton) and [Ahmed Al Harraq](#) (Advisor: Bhuvnesh Bharti) received the 2019 Most Outstanding Teaching Assistant (TA) Awards.

## IN GOOD COMPANY

### Junior/Senior Poster Presentations

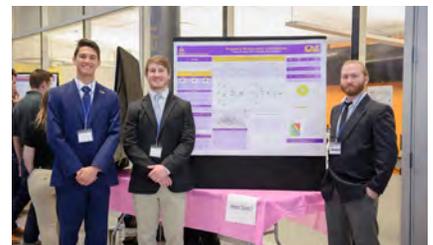
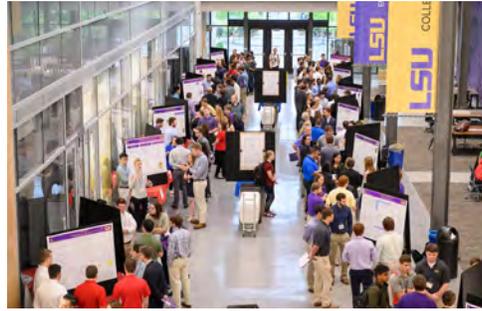
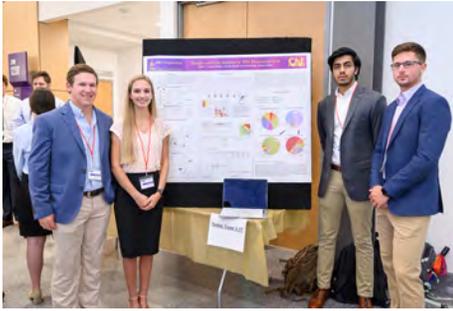
Your hard work has been noticed, and we appreciate your time and dedicated service to LSU ChE.

This year, we had 127 industry volunteers from 25 local chemical companies, 260 students, and 20 faculty members participate in the event, making it the largest to date.

Juniors were asked to design a propylene refrigeration system to support a new olefins plant. The students were given three separate refrigeration loads with three separate refrigeration temperatures. Students were required to select optimal operating pressures for the three refrigeration evaporators and the three refrigeration economizers. Students used Aspen Plus steady state simulation software to minimize the NPV of the combined capital and operating costs. Students then compared the relative benefits of electrical motor drives versus steam turbine drives for the refrigeration compressor. The students also evaluated the process safety risk associated with the system. Students collected relevant process safety information to identify three credible events. Using ALOHA software, the students modeled possible consequences and chose a maximum credible event. Using this scenario, the students evaluated the risk and mitigations. Four representatives from ExxonMobil—Chris Bailey, Justin Gregory, Rebecca Franco, and Sarah Schumaker—helped design this project.

Seniors designed a process for production of toluene diisocyanate (TDI) by phosgenation of toluenediamine (TDA). The design involves specification of a CSTR to carry out the phosgenation in the presence of monochlorobenzene (MCB) solvent, followed by the design of a separation system to separate the HCl byproduct, excess phosgene, MCB, TDI, and residue. In addition to a base case design, students examined options for heat integration, including the use of side condensers and reboilers in the distillation columns. The students were also tasked with qualitatively designing a control scheme for the process. The remainder of the project focused on process safety. Here, the students were asked to identify a maximum credible event and model the effect of this event on on-site buildings. They were also tasked with performing a limited HAZOP and LOPA study on a single node on the P&ID of a phosgene storage tank. Two representatives from BASF—Daniel Doody and Tiffany Robinson—helped design this project.







## TIME TO ENGAGE

### LSU STEM Workshop Offers 16 Demos to Students

LSU College of Engineering faculty and students spent the first day of their spring break working with middle schoolers as part of the college's ENGage program, a one-day workshop designed by Adam Melvin and Assistant Director of Student Programs and Outreach Adrienne Steele to expose young students to the STEM field. This year, 86 students in grades 6-8 came from Emily C. Watkins in LaPlace, West St. John in Edgard, and North Banks Middle and Woodlawn Elementary in Baton Rouge.

The 15 LSU faculty members, 40 graduate students, and 18 peer mentors held 16 demonstrations for the young students throughout the day that included how to help surgeons find tiny tumors; seeing how gold and silver nanoparticles can be used in chemical reactions; learning about DNA sequencing; differentiating light oils from heavy oils under fluorescent light; doing titration experiments as part of microfluidics; seeing how the Building Information Modeling, or BIM, Cave helps construction managers; and showing students how to produce electricity using seawater and river water.

"I was motivated to start ENGage after spending time at STEM nights at local area middle and high schools, in addition to volunteering at the LASM Engineering Day," Melvin said. "I found that most students in Baton Rouge thought the only job for an engineer was working in the petrochemical industry. Many students didn't know what bioengineering was and that there were engineers who could help doctors and patients. I wanted to provide an opportunity for students to learn about the diversity of jobs and challenges that engineers undertake on a daily basis."

"Adam approached me to help him create this event, specifically wanting to target middle school students, because traditionally, that's when kids, especially girls, start to lose interest in pursuing STEM careers," Steele said. "We formed a planning committee with four peer mentors to come up with the title and overall plans, and the first ENGage was held in 2017."

Over the past few years, LSU has seen as many as 200 students attend ENGage, with the percentage of female and minority students holding steady each year.

"This year, there were 48% female and 78% minority students," Steele said. "Also, more and more schools are finding out about ENGage, as we had two schools from out of town attend for the first time."

Melvin and Steele hope to eventually host an ENGage event in the fall, as well as the spring.

"ENGage is proud of its outstanding faculty who teach middle school students about all of the cool stuff going on at LSU," Melvin said.

## LEADING THE WAY

### Nuts & Bolts

In summer 2018, [David Zimmer](#) hosted a "Nuts and Bolts" session for all of our students taking summer courses. The students attending the session visited the LSU PERTT lab (operated by the PETE department) and were able to garner some real-life experience seeing equipment that goes into making up a chemical/petrochemical facility.

Dow Operations Leader Jenny Champion stated, "This is great! What a good opportunity for students to get some first-hand exposure to equipment."



### Rep Your Flag

The LSU Office of Diversity celebrated Rep Your Flag 2019 on Friday, March 22. Rep Your Flag is a fun way to showcase the cultural and international diversity that many of our students bring to campus, while celebrating their strength and diversity. This year, our department joined in the celebration.

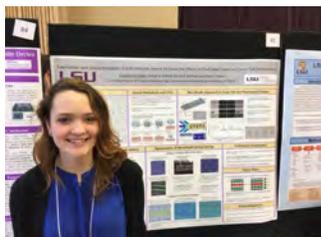
In our department alone, we have seven staff, 25 faculty, and 57 graduate students from 19 nations!



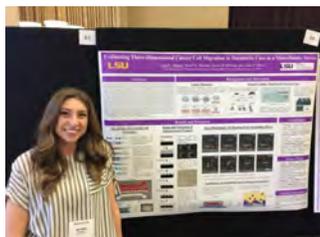
### LSU Discover Day

On Tuesday, April 9, 2019, a record 349 undergraduate students from LSU and 16 other universities and colleges presented their research and creative works at the 6th annual LSU Discover Day symposium in the LSU Student Union. This event provides a forum for undergraduate students to share their research and creative work with the LSU community and visitors.

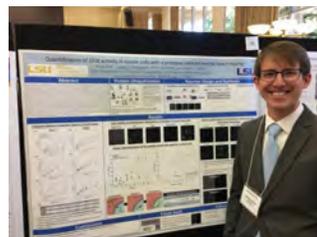
This year, we had a record number of ChE students participate. [Hunter Simonson](#) took second place in the Oral Presentations of the STEM Division. [Jacob Pettigrew](#) took second place in the Poster Presentation of the STEM Division. In addition, [Amy Morgan](#), [Sven Saemundsson](#), [Hunter Simonson](#), [Jacob Pettigrew](#), and [Kelly Robertson](#) took home cash prizes for scoring in the top 12 individual presentations in the College of Engineering.



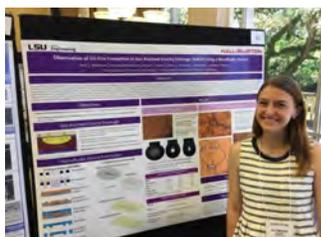
*Emmaline Miller*



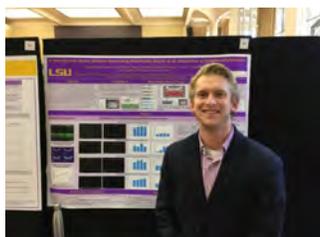
*Amy Morgan*



*Jacob Pettigrew*



*Kelly Robertson*



*Noah Smith*

## 2019 AIChE REGIONAL CONFERENCE

Thirty representatives from the LSU Chapter of the American Institute of Chemical Engineers attended the 2019 AIChE Southern Regional Conference at Mississippi State University. The conference consisted of chemical engineering-related workshops and competitions. LSU participated in the Jeopardy Competition, ChemE Car Competition, and Undergraduate Research and ChemE Car Poster Competitions. LSU placed 2nd at the Jeopardy Competition. The LSU ChemE Car Team “Eeyore” placed 4th at the ChemE Car Competition and qualified to compete at the annual meeting in Orlando, Florida. Finally, [Noah Smith](#) placed 2nd in the Undergraduate Research Poster Competition. We are very proud of the hard work and dedication of the LSU representatives who attended the conference.



## 2018 AIChE NATIONAL CONFERENCE



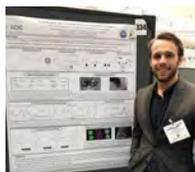
At the 2018 AIChE National Conference in Pittsburgh, we had outstanding graduate student representation.

Representing [Adam Melvin's](#) group were [Sharif Rahman](#) and [Mani Vaithyanathan](#). Rahman gave a talk on “Microfluidic Co-Culture of Triple Negative Breast Cancer Cells and Adipose Stem Cells.” In this study, a microfluidic device was developed to investigate this phenomenon by simultaneously co-culturing both MDA-MB-231 cells and ASCs. This device can be used to

assess how chemotherapeutic drugs targeting MDA-MB-231 cells affected cell proliferation, morphology, and protein expression in both cell lines. He also presented a poster on developing a 3D microfluidic device to under cell migration to highly isolate invasive cancer cells and understand cancer crosstalk. Vaithyanathan’s talk and poster highlighted the development of experimental and computational tools to address cellular variability in healthcare and environmental issues. Her talk focused on developing a platform to understand regulation of deubiquitinating enzyme in single multiple myeloma cells using a microfluidic device and a novel fluorescent biosensor. Further, her poster described a microfluidic device to screen alkaline phosphatase activity in single algae cells to understand allelopathy and harmful algal blooms.

Representing [Jerry Spivey's](#) group were [Swarom Kanitkar](#) and [Ashraf Abedin](#). Kanitkar presented on the effect of temperature in methane dehydroaromatization over Mo-supported on sulfated zirconia catalysts. The work involved use of Mo-supported SZ catalysts to convert methane into benzene and hydrogen directly. For this reaction, he investigated the role of temperature, which has a crucial role in the overall activity and product distribution. Abedin’s presentation included research work on the promotional effect of chromium on molybdenum-based sulfated zirconia solid acid catalyst for methane aromatization. It details the acidic effect of the added chromium improves direct methane conversion, as well as benzene selectivity, which is the main reaction product.

Representing Ye Xu's group were Saurin Rawal and Xun Cheng. Rawal presented his poster titled "Theoretical Investigation of the Effects of Metal Cations on Oxygen Reduction Reaction in Non-Aqueous Metal-Air Batteries." He described his work on the influence of interfacial electric field and solvent effects on metal-assisted ORR, solution mediated chemical reaction of solvated ions, and the effect of metal cations on the final battery discharge product. Cheng presented his poster titled "Interaction of Thiol Ligands with Gold and Effects on Electrocatalytic CO<sub>2</sub> Reduction," and talked about his study on the interaction of various ligands with gold surfaces and the resultant change in geometric and electronic properties of the gold surface. These effects were leveraged to influence electrochemical CO<sub>2</sub> reduction and hydrogen evolution reactions caused by the interactions.



Hunter Simonson, ChE senior, placed 3rd at the AICHE poster competition in the Materials Engineering and Sciences V division.

### Jeopardy

Our ChE Jeopardy team placed 2nd at this year's AICHE National Conference in Pittsburgh. Team members were Grant Landwehr, Hunter Simonson, Josh Campbell, and Riad Elkhanoufi.



### ChemE Car

Our ChemE Car Team placed 3rd in the ChemE Car Poster Competition. Team members included Katrina Taylor, Jake Campesi, Hunter Simonson, and Dominion Ajayi.



# Scholarships

## Alan M. Raymond Endowed Scholarship

Abigail Ferrel  
Darby Maloch

## American Society of Sugar Cane Technologists Scholarship

Giuliano Campesi

## BASF Team Chemistry Scholarship

Emma Joslin

## Board of Regents Graduate Fellowship

Hannah Hymel  
Cameron Roman

## BP Scholarship for Energy in Engineering

Nihal Agrawal  
Raquel Domingos

## BP Scholarship for Energy in Engineering #2

Gloria Alvarado  
Raquel Domingos  
Isaiah Williams

## Chevron Energy Leaders Scholarship in Engineering

Joshua Janway  
Isaiah Williams  
Cameron Ysidron

## Chevron Graduate Student Assistantship

Natalia da Silva Moura

## CITGO Petroleum Scholarship in Chemical Engineering

Jeffrey Millet  
Gyeong Yoo

## Clara & Frank R. Groves Sr. Engineering Scholarship

Annie O'Keefe

## Coates Conference Travel Award

Jorge Asis Charbel Chebeir  
Xun Cheng  
Elizabeth Hurst  
Sharif Rahman  
Saurin Rawal  
Karthik Vutukuru  
Manibarathi Vaithyanathan

## David S. & Martha L. Bunnell Scholarship

Jeffery Anderson

## Economic Development Award

Zhizhong "John" Ding  
Sharareh Heidarian  
Jin Gyun Lee

## Engineering Excellence Scholarship

Leah Potylchansky

## Eugene R. Cox Scholarship

Griffin Rose

## ExxonMobil Diversity Scholarship

Gloria Alvarado  
Riad Elkhanoufi  
Dwayne Keller  
Leonardo Martinez  
Tristin Paul-Olivier  
Karina Ramirez Rodriguez

## Flagship Graduate Assistantship

Tochukwu Ofoegbuna  
Bahnam Safavinia  
Daniel Willis

## Floyd S. Edmiston Jr. Endowed Memorial Scholarship

Joshua Janway

## Francis P. Richard Sr. Family Scholarship in Engineering

Andrew Badeaux  
Joshua Janway

## Fulbright Fellowship

Daniel Norena Caro

## Gail Robinson Wilbur Scholarship

Alexis Hanson

## Gene Purdue Lowe Scholarship

Jordan Cantrell  
Madison Casabat  
Morgan Donaldson  
William Dowden  
Jaime Keller  
Christopher Leblanc  
Brandon Perrier  
Trey Poirrier  
David Quiring  
Torry Rayne  
Emma Roger  
Damian Runkle  
Estelle Seghers  
Haley Strong

## George A. Daniels Graduate Fellowship

Divakar Reddy Aireddy  
Ahmed Al Harraq  
Deepra Bhattacharya  
Sara Figueiredo Stofela  
Matthew Jordan  
Feroogh Khezeli  
Avinash Reddy Mali  
Hiba Malik  
Amber Pete  
Md Saeedur Rahman  
Jingya Xiao

## Gerard Family Undergraduate Scholarship

A'mer Abu Shamleh  
Jeffrey Anderson  
Joseph Balhoff  
Joshua Campbell  
Alexis Hanson

## Gordon A. & Mary Cain Graduate Assistantship

Yuxin Fang  
Karthik Vutukuru

## Halliburton Scholars Program

Morgan Donaldson  
Abigail Ferrel  
Sarah Jones  
Phuc Nguyen  
Leah Potylchansky  
Kelly Robertson  
Lucille Verster

## Hargrove Foundation Scholarship

Gloria Alvarado  
Cole Guillory

## Harold E. Colvard College of Engineering Scholarship

Nathaniel Anderson

## Henry G. Abbott Scholarship

Kristina Gutierrez

## Houston-LSU Engineering Scholarship

Annie O'Keefe

## Huel D. Perkins Diversity Fellowship

Amber Pete

## Jerry & Gloria DesRoche Fund-Freshman Scholarships

Kelsey Blosser

## Jesse Coates Memorial Scholarship

A'mer Abu Shamleh

## Leo Broering Memorial Scholarship

Stephanie Sullivan

## Leo C. Comeaux Chemical Engineering Scholarship

Riad Elkhanoufi

## Lubrizol Scholarship

Giuliano Campesi  
Grant Landwehr

**Mable & Boykin W. Pegues Scholarship**

Blake Baldassarro  
Joseph Balhoff  
Kelsey Blosser  
Madison Burdett  
Christopher Ferrier  
Eleanor Golson  
Cameron Martin

**Marathon Oil Undergraduate Minority Scholarship**

Emily Bergeron

**Marathon Scholarship in Chemical Engineering**

Suzannah Mahoney

**Mark & Laurie Sutton Scholarship**

Catherine Harper  
Troy Inman

**NACME Scholarship**

Erica Bickham  
Riad Elkhanoufi  
Sherlyn Villarreal

**O. Dewitt Duncan Jr. Endowed Scholarship**

Emily Bergeron  
Leonardo Martinez  
Justin Nhan  
Tristin Paul-Olivier  
Hunter Simonson

**Paul M. Horton Memorial Undergraduate Scholarship**

Nathaniel Anderson  
Kaitryana Leinback  
Mason Miranda

**Paul N. Howell Endowed Memorial Scholarship**

Gloria Alvarado

**Phillips 66 Fuel for the Future Scholarship**

Olivia Arcemont  
Emma Joslin  
Darby Maloch  
Leonardo Martinez  
Ruby Roberg  
Estelle Seghers  
Anna Sheffield  
Jessica Sims  
Jason Tullos

**R.L. Hartman Memorial Scholarship**

Alice Xie

**Ram N. Bhatia Scholarship**

Nihal Agrawal

**Ryan D. Fontenot Scholarship**

Trevor Thrasher

**S&B Engineers Brookshire Scholarship in Engineering**

A'mer Abu Shمله  
Elizabeth Allain

Gloria Alvarado  
Jeffrey Anderson  
Courtney Antie  
Mary Arotin  
Colleen Atkins  
Andrew Badeaux  
Joseph Balhoff  
Manon Bart  
Alexander Baumann  
Gena Bergeron  
Brannon Bienasz  
Justin Blanchard  
Kelsey Blosser  
Matthew Bryant  
Lee Burnett  
Brent Burns  
Vanessa Cabrera  
Bridget Cadigan  
Joshua Campbell  
Megan Campbell  
Giuliano Campesi  
Stephen Cannon  
Regina Champagne  
Kelly Cohen  
Theron Cooper  
Kathryn Craft  
Courtney Cribbs  
Gabrielle Davis  
Daniel Dean  
Tristan Dorgan  
Lina Efremenkova  
Riad Elkhanoufi  
Abdulrahman Ezzir  
Samer Farhud  
Aaron Faulkner  
Sandini Fernando  
Wesley Fontenot  
Abigail Geiger  
Hailey Germain  
Corey Guercio  
Rathnayaka Gunasingha  
Alexis Hanson  
Terra Harris  
Suzannah Hill  
David Janis  
Tyler Johnson  
Grant Landwehr  
Megan Le  
Christopher Leblanc  
Parker LeBlanc  
Emily Loisel  
Mallory Madere  
Tara Malone  
Mae Mangaoil  
Amoni McNair  
Jeffrey Millet  
Amy Morgan  
Courtney Musso  
Phuc Nguyen  
Sonja Nguyen  
Truong Nguyen  
Justin Nhan  
Schuyler Pablico  
Andrew Perrodin  
Jacob Pettigrew  
David Phan  
Bradley Poret  
Amirali Rafiei  
Christopher Reed  
Eric Reviere

Kory Robert  
Emma Roger  
Miranda Ross  
Damian Runkle  
Cory Ryan  
Ryan Scroggins  
Chrolos Sedky  
Hunter Simonson  
Haley Strong  
Brent Talamo  
Noah Taylor  
Marin Thomas  
John Tooraen  
Austin Watts  
Omer Wolff  
Landon Zeringue

**Scholarship for MEP Students in Chemical Engineering**

Mason Miranda  
Karina Ramirez Rodriguez

**Suzanne & Jamal al-Barzinji Engineering Scholarship**

Nihal Agrawal

**Science without Borders Fellowship**

Sara Figueiredo Stofela

**Thomas H. Hopkins Scholarship**

Evan Casper  
Jacob Pettigrew  
Anthony Sagnard

**Tiger Athletic Foundation Scholarship**

Thomas Abrahams  
Nathaniel Anderson  
Christopher Ferrier  
Jaime Keller  
Philip Stratton  
Nathan Zeringue

**Traditions Scholarship in Engineering**

Thomas Abrahams  
Nihal Agrawal  
Darby Maloch  
Estelle Seghers  
Angela Stark  
Katrina Taylor

**Walter G. Middleton Jr. Endowed Scholarship**

Gabrielle Davis  
Nathan Penalber

**William A. Brookshire Graduate Assistantship in Chemical Engineering**

Yan Ma  
Vidhyadhar Manee  
Ben Peterson

**William E. McFatter Endowed Scholarship**

Collins Daigle  
Truong Nguyen

## BREAKING THE MOLD

### National Science Foundation (NSF) Graduate Research Fellowship Program

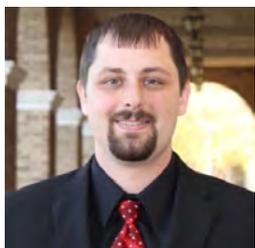
Matthew Jordan, ChE PhD candidate, Grant Landwehr, BS in ChE December 2018 (who will pursue his PhD at Northwestern University), and Breanna Lee, BS in ChE May 2018 (who is currently pursuing her PhD in biomedical engineering from Emory University and Georgia Tech) each received a 2019 National Science Foundation Graduate Research Fellowship.

The NSF Graduate Research Fellowship Program (GRFP) helps ensure the vitality of the human resource base of science and engineering in the United States and reinforces its diversity. The program recognizes and supports outstanding graduate students in NSF-supported science, technology, engineering, and mathematics disciplines who are pursuing research-based master's and doctoral degrees at accredited US institutions.

As the oldest graduate fellowship of its kind, the GRFP has a long history of selecting recipients who achieve high levels of success in their future academic and professional careers. The reputation of the GRFP follows recipients and often helps them become life-long leaders that contribute significantly to both scientific innovation and teaching. Past fellows include numerous Nobel Prize winners, US Secretary of Energy Steven Chu, Google founder Sergey Brin, and *Freakonomics* co-author Steven Levitt.

Fellows share in the prestige and opportunities that become available when they are selected. Fellows benefit from a three-year annual stipend of \$34,000, along with a \$12,000 cost of education allowance for tuition and fees (paid to the institution), opportunities for international research and professional development, and the freedom to conduct their own research at any accredited US institution of graduate education they choose.

NSF Fellows are anticipated to become knowledge experts who can contribute significantly to research, teaching, and innovations in science and engineering. These individuals are crucial to maintaining and advancing the nation's technological infrastructure and national security, as well as contributing to the economic well-being of society at large.



Matthew Jordan



Grant Landwehr



Breanna Lee

### Jack Kent Cooke Graduate Scholar

The Jack Kent Cooke Foundation, a nonprofit organization that supports high-achieving students with financial need, announced the award of up to approximately \$7 million total to 82 students who have recently begun graduate programs at some of the most highly selective institutions in the United States and United Kingdom.

The lone LSU recipient was Matthew Jordan, a chemical engineering PhD student from Pittsburgh, Texas. He previously earned his bachelor's degree from Texas Tech University in May 2017.

Jordan, as a Cooke Graduate Scholar, is eligible to receive up to \$75,000 total for four years.

"Even students who excel to and through college often face financial roadblocks on the path to graduate studies," said Seppy Basili, executive director of the Jack Kent Cooke Foundation. "These scholars are poised to make an impact in fields from art to medicine in ways that will transform our lives and society. Cooke Scholars share a remarkable focus on solving pressing issues, and we can't wait to see what this year's recipients will accomplish."

## DISTINGUISHED COMMUNICATOR AWARDS

Six ChE undergraduate students received Distinguished Communicator Awards this past year as part of LSU CxC. Joseph Balhoff, Colleen Atkins, and Jeffery Millet, advised by Adam Melvin, and Justin Nhan, advised by Liz Melvin, were recognized spring 2019. Miranda Ross and Jessica Mire, advised by Adam Melvin, were recognized fall 2018.

This award is given to students who have demonstrated excellence in four modes of communication, including written, spoken, visual, and technological. These students organized examples of their work into an online portfolio, in addition to completing CxC-approved courses and advanced training in communication.



### SPRING 2019

Adam Melvin, Jeffery Millet, Justin Nahn,

Joseph Balhoff, Colleen Atkins, and Liz Melvin



### FALL 2018

Miranda Ross, Adam Melvin,

and Jessica Mire

# RECENT ALUMNI

## Doctor of Philosophy in Chemical Engineering

Jorgé Asis Charbel Chebeir  
Yuxin Fang  
Swarom Ravindra Kanitkar  
Nora Safa  
Santiago David Salas Ortiz  
Jielin Yu  
Chuanlin Zhao

## Master of Science in Chemical Engineering

Kushal Ghale  
Wei Guan  
Le Zhang

## Bachelor of Science in Chemical Engineering

A'mer Abu Shamleh ~ ^  
Elizabeth Clare Allain  
Ryan Anderson  
Victoria Noel Andrus  
Courtney Rae Antie  
Mary Katherine Arotin  
Colleen Antoinette Atkins  
Andrew Joseph Badeaux \*  
Austen Henry Bailey  
Joseph Brady Balhoff ^  
Alexander Richard Baumann  
Brigette Therese Berbling  
Emily Louise Bergeron +  
Gabriella Martha Bergeron  
Abby Lynn Besselman  
Brannon Marshall Bienasz  
Ryan Wayne Bishop  
Spencer Louis Blum  
Olivia Odell Bradley  
Tabatha Grace Bradley

Megan Ann Bridges  
Ashley Rosalia Brignac \*  
Lee Robert Burnett  
Brent Ashton Burns ^  
Ashlynn Taylor Butler  
Vanessa Cabrera  
Joshua Michael Campbell ^  
Megan Elizabeth Campbell  
Giuliano Edward Campesi ~ ^  
Stephen Parker Cannon  
Joshua James Clavin  
Cameron Michael Cochran  
Julia Helen Comeaux  
Courtney Jean Cribbs  
Collins Jeffrey John Daigle \*  
Brittany Delatte  
Daniel Michael Devillier +  
Michael McGovern Doggett  
Riad Elkhanoufi • ^  
Austin James Fabre  
Samer Naser Farhud  
Michael Joseph Faust Jr.  
Austin Neil Fitzgerald  
Josh Daniel Florida  
Wesley Tate Fontenet  
Mazie Claire Foret  
Annie Kate Foster  
Jonathan Stephen Garitty  
Andrew John Gayle  
Abigail Marie Geiger  
Heather Lynn Geoffroy Robillard +  
Hailey Gabrielle German  
Maria Paula Gomez Mendez  
Daniel Isaac Gonzalez Hernandez  
Kristopher Lee Goodson  
Zachery Joseph Gordon  
Corey Vance Guercio  
Cole Scott Lee Guillory  
Elise Christina Guillory  
Sara Elizabeth Guillory  
Monica Ann Guillot ~ ^  
Rathnayaka M. D. D. Gunasingha  
Alexis Renée Hanson ~ ^

Gracie Anne Hastings  
Elizabeth Marie Hayes  
Jacob Walker Hewson  
Suzannah Leigh Hill  
Nathan Philip Holley  
Farzan Ikhlas  
Rebecca Layne Ishee  
Austin McBride James  
Joshua Mark Janway ^  
Paolo Gabriele Jimenez Antenucci  
Peyton Thomas Joffrion  
Megan Rene Justice  
Meghan Thanhmai Kenyon  
Madeline Nicole Koenig  
Alona Komarenko  
Hailey Nicole Kosutic  
Grant Michael Landwehr ~ ^  
Lexie Nicole Langley  
Luke Lane Larive  
Wyatt Joseph LeJeune  
Emily Elizabeth Lewis  
Melina Amarys Liriano  
Kirsten Lena Maki  
Kiegan Matthew Marek  
Leonardo Daniel Martinez +  
Joshua Barry Melugin  
Aly Elbashir Metwally Mohamed \*  
Evan Joseph Michel  
Jessica Marie Mire  
Jeffrey Porteous Millet \*  
Amy Blair Morgan  
Courtney Rae Musso  
William Cullen Neely  
Dustin Michael Neuville  
Diana My Ai Nhi Nguyen  
Phuc Hong Nguyen  
Truong Joseph Nguyen  
Justin Ti Minh Nhan +  
Mia Samantha O'Brien  
Annie Gilham O'Keefe ^  
Artney Raymond Olivero  
Tristin Noel Paul-Olivier +  
Andrew Joseph Perrodin

Garvin Paul Pertuit  
Peyton Taylor Pertuit  
Jacob Houston Pettigrew  
Albaro Antonio Pineda, II  
Bryan David Pinner  
Madeline Paige Pipkin \*  
Bradley Joseph Poret  
Alexandra Roberta Powajbo  
Thinh Tien Quach  
Christopher Tyler Reed  
Blake Lawrence Ritchie  
Miranda Leigh Ross  
Mason Luke Roussel  
Damian Alexander Runkle  
Cory Joseph Ryan  
Hadley Lane Scallan  
Thomas Jonathon Schroeder  
Hunter Wayne Simonson \*  
Connor Daniel Sinanan  
Napat Sitkrongwong  
Colleen Elizabeth Slade  
Molly Kathleen Smith  
Angela Michelle Stark  
Brent Michael Talamo  
Austin Joseph Troxler  
Jeremy Stephen Wade  
Cameron Joseph Waguespack  
Andrew Thomas Watkins  
Courtney Marie Whittle  
Casey Marie Wick  
Omer Douglas Wolff  
Gyeong Min Yoo ^  
Cameron Gray Ysidron  
Landon Charles Zeringue

### Degrees with Honors

~ University Medalist

^ Summa Cum Laude (3.90-4.00)

+ Magna Cum Laude (3.80-3.89)

\* Cum Laude (3.70-3.79)



## Honors College Graduates

The LSU Honors College engages a diverse population of high-achieving students in a dynamic interaction of outstanding instruction, innovative research, and public service. It seeks to train today's high-achieving students to become tomorrow's leaders. These students graduate with college honors, completing a minimum of 32 hours of honors coursework, including the upper-division honors program. The 2019 chemical engineering honors graduates were Joseph Balhoff, Spencer Blum, Joshua Campbell, Riad Elkhanoufi, Grant Landwehr, and Hunter Simonson.

**Joseph Balhoff** completed his honors thesis entitled "Design and Optimization of a Microfluidic Device to Study the Effects of Fluid Shear Stress on Extravasation." This thesis is the culmination of two years of undergraduate research under the direction of Adam Melvin. Balhoff's project focused on developing a new technology to study how fluid shear stress altered cancer cells' ability to migrate during metastasis. He performed a series of COMSOL simulations to design a novel geometry, which he then fabricated and tested as a microfluidic device. In addition to his research, he served as a co-author on two peer-reviewed manuscripts. He will be attending law school at the University of Virginia.

**Spencer Blum** (Thesis title: "A Discrete Element Method Study of Granular Self-Organization in an Orbital-Driven Sphere and Computational Fluid Dynamics Simulations of Slurry Flow in a Single-Loop Loop Reactor," Advisor: Krishnaswamy Nandakumar). Blum worked on advanced CFD/DEM simulation of two processes commonly encountered in mixing and reaction of chemicals. Both involved understanding the complex dynamics of fluid particle systems using high-performance computing. The first one dealt with poly olefin slurry reactors, while the second involved mixing particles in a commonly used Shaker table experiment. He worked with Dr. Jielin Yu.

**Joshua Campbell** completed his honors thesis entitled "Microfluidic Generation of Orthogonal Chemical Gradients to Study Cellular Decision-Making During 3D Migration." This thesis is the culmination of three years of undergraduate research under the direction of Adam Melvin. Campbell's research focused on developing, characterizing, and using microfluidic flow-free gradient generators to study cellular decision-making during migration. Specifically, his device was designed to expose cells to competing chemical gradients to study cellular decision making during the early stages of metastasis. He was awarded an Ogden Honors College Outstanding Thesis Award for his efforts. In addition to his research, Campbell was the lead author on a review article on microfluidic devices used for disease diagnostics. He will be attending medical school at LSU HSC.

**Riad Elkhanoufi** (Thesis title: "Design and Characterization of a Triple-Input Microfluidic Droplet Trapping Array Towards Multiplexed and Dynamic Single Cell Analysis," Advisor: Adam Melvin). Elkhanoufi's honors thesis focused on the development of a multiplexed microfluidic device to interrogate how a population of cells responded to different doses and combinations of drugs. He explored two different droplet microfluidic geometries to identify an optimal approach for single cell and nanoparticle encapsulation followed by on-chip trapping and analysis of these aqueous droplets. This project is in collaboration with James Dorman.

**Grant Landwehr** (Thesis title: "Single Cell Analysis of Fluid Shear Stress Induced Breast Cancer Cell Phenotypic Changes in a Microfluidic Device," Advisor: Adam Melvin). Landwehr's honors thesis involved the development of a microfluidic device to trap single cancer cells and then expose them to defined durations and magnitudes of fluid shear stress, similar to what cancer cells experience during extravasation. He found that different cell types exhibited significant heterogeneity in their response to shear, as evidenced by changes in area and circularity. His work resulted in a recent publication in *Biomicrofluidics*. This project is in collaboration with Y. John Kim in the Department of Chemical and Biological Engineering at the University of Alabama.

**Hunter Simonson's** research focused on understanding the redox chemistry for the synthesis of iron oxide (Fe<sub>3</sub>O<sub>4</sub>) nanoparticles for high-efficiency energy conversion in hyperthermia cancer treatments. The synthesis of high-purity Fe<sub>3</sub>O<sub>4</sub> nanoparticles has previously been limited to oxygenation of boiling organic solvents, requiring precise control to prevent explosions. He developed a facile synthesis process in which redox chemistry can be overcome through engineered ratios of precursors with different oxidation states. Additionally, his work investigated the role of processing to remove unwanted surfactants, which can be detrimental to nanoparticle growth. Simonson completed his thesis under the direction of James Dorman.



K. Nandakumar, Spencer Blum, Riad Elkhanoufi, Grant Landwehr, and Adam Melvin



Hunter Simonson, James Dorman, Joseph Balhoff, Adam Melvin, and Joshua Campbell

## SPOTLIGHT | *Professor Santiago Salas Ortiz*



**“I am very grateful with my alma mater, Louisiana State University, for opening their doors and letting me enroll in the doctoral program, and now I am humbled with the duty of being faculty at the best university of my home country. It is certainly a challenge to guide the new generations of chemical engineers that will serve in Ecuador, Latin America, and the world.”**

**SANTIAGO SALAS ORTIZ, PHD 2019**

**Professor, ESPOL**

### Becoming a Tiger

Santiago David Salas Ortiz first joined the Cain Department of Chemical Engineering in the fall of 2014 as a Fulbright Scholar and Master of Science in Chemical Engineering (MS in ChE) graduate student in José Romagnoli's research group. He earned his MS in ChE in spring 2016. His thesis was entitled "Extensive Sensitivity Analysis and Parallel Stochastic Global Optimization Using Radial Basis Functions of Integrated Biorefineries Under Operational Level Uncertainties."

He didn't stop there. Salas continued his graduate studies as a Doctor of Philosophy in Chemical Engineering graduate student in Romagnoli's research group here at LSU and earned his doctoral degree summer 2019. His dissertation was entitled "A Model-Based Framework for the Smart Manufacturing of Polymers."

### Becoming a Professor

**Escuela Superior Politecnica del Litoral (ESPOL) & Recruiting High-Performing Students for LSU ChE** by Santiago David Salas Ortiz

As faculty at ESPOL, I am currently lecturing Chemical Plant Design (in English) and Chemical Process Simulation (in Spanish) at the undergraduate level for the senior class. In addition, I am starting a Process Systems Engineering (PSE) research group with other ESPOL faculty, including Wilfredo Angulo (PhD in mathematics from the University of Paris), Dany DeCecchis (PhD in computer science from the University of San Diego), and Yris Gonzales (PhD in chemical engineering from the Polytechnic Institute of Madrid). Our idea is to bring together applied mathematics and computer science for solving chemical engineering problems. Of course, I am in touch with my advisor, role model, and friend, Professor José A. Romagnoli, and friends at the PSE Lab at LSU.

On June 28, I gave a speech/presentation commemorating the Ecuadorian Chemical Engineer Day. The title of the presentation was "Perspectives of the Chemical Engineering Discipline in Ecuador: From Eng. Peiger to the Use of AI in Chemical Plants." Also, ESPOL's AIChE Student Chapter gave me the honor of becoming their advisor.

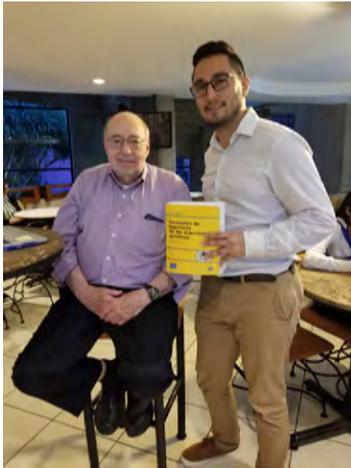
In terms of academic activities, from July 15-20, 2019, the XXV Chemical Engineering Students Conference (COLAEIQ) in San José, Costa Rica, took place. In this opportunity, the host university was the University of Costa Rica. Around 300 chemical engineering students from Latin America gathered for one week, attending different talks, courses, contests, and social activities that promoted cultural sharing among its participants. In this conference, I was invited to give a course titled “Introduction to the Design of Natural Gas Processing Plants” and a lecture titled “New Technologies and Computer-Aided Tools in the Design of Chemical Plants.” The closing lecture of the conference was given by Scott Fogler, emeritus professor of chemical engineering at the University of Michigan, renowned for his book “Elements of Chemical Reaction Engineering.” I had the opportunity of meeting him in 2010 when I was an undergrad, and I was very surprised he recognized me even after I have put some weight on (he literally mentioned this). While talking, he gave me some advice on how to become a successful professor: care about your students, make learning funny, and let your students become the best version of themselves. Finally, he mentioned that no matter where you get your PhD, what matters is what you do with it.



*Presentation at Ecuadorian Chemical Engineer Day*



*Salas with students from Honduras and Guatemala*



*Salas with Scott Fogler*



*Salas with his ESPOL students and Scott Fogler*

# ROLL CALL

## 2019



**Rebecca Ishee  
(BS 2019)**

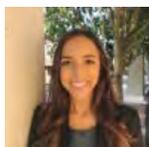
I am working at Syngenta in St. Gabriel as a process engineer. I work in the Environmental Operations unit, where we treat the site's waste water and waste acid streams, before sending treated, clean water to the Mississippi River. I am using my ChE degree to think critically and help solve problems that arise in the unit. I am also responsible for monitoring and reporting to environmental agencies.

## 2018



**Joshua Baldassaro  
(BS 2018)**

I am currently a process engineer for Mosaic Fertilizer in charge of an ammonia production plant and utility support plant. My daily duties range from assisting with large asset-sustaining capital projects, troubleshooting and optimizing plant performance, and assisting departments, such as mechanical integrity and environmental, in maintaining compliance per federal and state standards. In my current position, I mostly utilize concepts of fluid dynamics, thermodynamics, and unit operations to complete daily and ongoing tasks and projects. While industry work is not always equivalent to what you may have learned in school, LSU ChE gave me the foundation of engineering concepts and instilled the notion of intellectual thinking and hard work, which allows me to accomplish tasks for a wide range of areas.



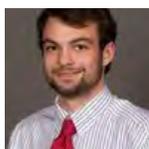
**Emily Duplechain  
(BS 2018)**

For the past year, I have been working for Shell at the Shell Geismar Chemical Plant. My title is Environmental Representative, but my chemical engineering degree has allowed me to gain experience in both environmental and process engineering opportunities.



**Yuxin Fang  
(PHD 2018)**

I am now working as a Packaging R&D Engineer at Intel. My PhD dissertation focused on electrochemistry. Elytic plating and less plating are two important building blocks for packaging, which are based on the fundamentals of electrochemistry.



**Joseph Fishburn  
(BS 2018)**

Currently, I am a run plant engineer working for Shintech in the ethylene plant. I use my degree by working with operators and production supervisors to make day-to-day decisions on how to operate the plant.



**Meredith LeBlanc  
(BS 2018)**

Currently, I am executing several productivity projects with the goal of increasing production capacity and eliminating product quality defects. I also continually conduct product post-run reviews to evaluate yield, waste, and production rate with the purpose of maintaining accurate product recipes, among many other tasks. Our company (Honeywell UOP) is the world's largest supplier of activated alumina and versal alumina powders, which are essential to the refining industry, and it is mine and my colleagues' responsibility to ensure the plant is meeting production volumes and producing quality products.



**Breanna Lee  
(BS 2018)**

Currently, I'm in the joint biomedical engineering PhD program with Georgia Tech and Emory University. My area of research focuses on using machine learning and data science to improve pediatric predictive medicine. I plan to work on technology that optimizes diagnostic and prognostic outcomes through data engineering and analytics.



**Jessica Mire  
(BS 2018)**

I am currently working at The Mosaic Company in St. James, Louisiana, as a process engineer. With my chemical engineering degree, I have performed controller tuning to implement safer and more efficient process control. I also assist with process optimization, capital projects, and environmental compliance assurance.



**Nora Safa  
(PHD 2018)**

Dr. Nora Safa is a Scientific Advisor for Intellectual Property in the Palo Alto office of Wilson, Sonsini, Goodrich & Rosati, where she is a member of the firm's patents and innovations practice. Her practice focuses on patent prosecution and due diligence matters related to biotechnology, chemical engineering, diagnostics, microfluidics, and proteins.

Prior to joining the firm, Safa completed her doctoral dissertation on "Direct Quantification of Deubiquitinating Enzyme Activity in Single Intact Cells," which received an outstanding dissertation award by the LSU CoE. She developed a fluorescent, cell-permeable, peptide-based reporter of enzyme activity and a droplet microfluidic platform, in addition to analytical procedures for single cell analysis of intracellular enzyme activity.

In collaboration with intellectual property attorneys and scientists across interdisciplinary fields from chemistry to engineering and life sciences, we represent companies in technology and life sciences. Wilson, Sonsini, Goodrich & Rosati is the premier legal advisor to technology, life sciences, and growth enterprises worldwide, as well as the venture firms, private equity firms, and investment banks that finance them. We represent companies from entrepreneurial start-ups to multibillion-dollar global corporations at every stage of development. The firm's attorneys collaborate across a comprehensive range of practice areas and industry groups to help the management, boards of directors, shareholders, and in-house counsel of our clients address their most pressing challenges and pursue their most promising opportunities.



**Claire Thibodeaux**  
(BS 2018)

I am currently working as a project/production engineer at Honeywell-Baton Rouge as a contractor for Brown and Root. I do energy and material balances just about every day, and problem-solving is a huge part of my job. I use the Management of Change system to make changes to processes in the plant and have to go through many approvals and safety assessments to implement the changes. Working in a fluorines plant, process safety is paramount, and we do everything we can to make the processes both efficient and inherently safe.

## 2017



**Evan Andrews**  
(PHD 2017)

I have been working as a post-doc at Pacific Northwest National Laboratory on the electrochemical upgrading of biomass-derived fuels. By converting biomass into liquid organics and using renewable energy to hydrogenate the product into fuel precursors, a CO<sub>2</sub> neutral liquid fuel can be produced. I have also been investigating electrochemical wastewater treatment as a means of reducing industrial pollution. I hope to continue working on alternative energy technology and industrial electrochemical processes in the future.



**Brandon Lewis**  
(BS 2017)

I've moved from Louisiana to Colorado since graduating. I currently use my degree as a process engineer for an upstream and midstream oil and gas consulting company. I mostly focus on PSV and flare studies for midstream clients, though I have been involved with front-end stabilizer design and optimization for a client compressor station, atmospheric tank pressure/vacuum relief evaluations for upstream clients, and equipment additions and P&ID redlines for EPC projects. In my free time, I love to travel, hike/camp in the mountains, and go fly fishing.

## 2016



**Zach Sirera**  
(BS 2016)

I currently work on capital projects for a large chemical company, managing large technology expansions and upgrades of our facilities. My ChE degree from LSU gave me the foundation I needed to get into the plant and make a difference, starting on day one. With my degree, I have been able to enhance productivity and recognize and solve problems.



**Thomas Turner**  
(BS 2016)

In my current role I provide operational and technical support for a 120 MMSCFD Steam Methane Reformer and 10 MW Steam Turbine Generator serving as the primary engineer, environmental compliance officer, and MOC and Project Manager for the entire facility in Rodeo, California. Other responsibilities include coordinating and preparing for facility and TAR outage in October 2019; identifying major maintenance needs and optimization opportunities.

## 2015



**Oladapo Ayeni**  
(PHD 2015, MS 2013)

I currently work for Intel Corporation as a development engineer. My role requires enabling data-driven decisions for various projects critical to intel's 10nm technology roadmap. My area of research at LSU was in computational fluid dynamics. The skills I currently use for analyzing large datasets at my job were honed during my time as a grad student under Dr. Nandakumar's guidance.



**Shelbi Bertrand Baham**  
(BS 2015)

After graduation I went to work as a Six Sigma Project Engineer at Hexion Inc. in Houston, Texas. I received excellent training and a ton of exposure to high-level projects and initiatives across the world. I even got the chance to lead a company-wide initiative. I am grateful to my boss and the company for all of the experiences they gave me, and I was sad to leave due to company layoffs. But, the silver lining was my opportunity to return home with my newborn son and begin building a new career close to home and my alma mater. I recently accepted a new role at Birla Carbon, where I will be working as a Process Engineer and Project Engineer. I am excited for this new role and what I will learn.



**Aryan Geraili**  
(PHD 2015, MS 2013)

My PhD research was focused on developing a framework for integrated modeling and optimization of sustainable renewable energy systems. I worked under the supervision of José Romagnoli. In my graduate studies, I focused on developing my skills in the area of process systems engineering. In the four years since graduation, I have worked for R&D and manufacturing organizations in chemical and consumer products companies. I have been involved in mathematical modeling and optimization of new products and processes to help the scale-up and technology evaluations. Also, I develop dynamic models based on first principles and use advanced control strategies to increase the capacity and improve the quality of products in existing processes.



**Aubrey Heath**  
(PHD 2015)

I've been at Albemarle for more than a year now. With this job, I'm back in research, and we are working to scale-up a new product to production. With this project comes plenty of lab work and experimental development, all skills I learned while earning my PhD at LSU.

## 2014



**Onur Dogu**  
(MS 2014)

Right now, I am in the process of getting a PhD from Ghent University, Laboratory of Chemical Technology, in Ghent, Belgium. The MSc I got from LSU really helped me get this position. My PhD is about chemical recycling of waste plastics. The goal is to understand the intrinsic kinetics behind the process.

## 2013



**Taylor James-Lightner**  
(BS 2013)

I work for the Louisiana Department of Environmental Quality as an Environmental Chemical Specialist. I review processes and air emissions from manufacturing and chemical facilities to write permits for them.

## 2012



**Muddathir Amin**  
(MS 2012, BS 2011)

When I started at LSU as a chemical engineering student, I always wondered how my education would benefit me in the future. A few years later as a Process Engineer with Bridgestone Americas, it became clear. Thermodynamic concepts were relevant in producing high-quality rubber. Process design fundamentals were critical in collaborating with R&D on new material formulations, to name a few. These courses are taught at LSU by some of the finest instructors in their fields. I'm now with Georgia-Pacific Corrugated as a Process Improvement Manager in California. My focus is to cross-functionally streamline commercial and operations sectors of the business, leading various teams. Unsurprisingly, effective communication is imperative in developing strategy and driving sustainable change, concomitantly working with multiple stakeholders having different backgrounds. The way our engineering program at LSU is structured has played a vital role in establishing a solid foundation for development. I'm still in touch with my classmates, and they can attest that the heavy emphasis on analytical thinking, effective communication on projects (individual or group), interactive classroom discussions, and engineering problems emulating real industry challenges, continues to be advantageous. We've inculcated this engineering mindset to systematically solve problems that transcend boundaries.



**Nimesh Poddar**  
(PHD 2012)

I am a Research Engineer in the Analytical R&D Department at Sasol North America (Westlake, Louisiana), supporting the R&D groups and the manufacturing units globally. In addition to sound technical knowledge, the core values—i.e. high-quality work, critical thinking, attention to detail, and collaboration/team work—instilled in me during my PhD education at LSU enabled me to participate on a myriad of projects; succeed at them under high-pressure situations; and be recognized as a reliable resource when it comes to handling non-routine requests for the HPLC lab. Working at a large chemical company, which is undergoing such a massive expansion as Sasol is, brings a new set of challenges every day, and I do not see how I could accomplish what I do without the rigorous education I received from M. J. Wornat in the Chemical Engineering Department at LSU.

## 2011



**Nitin Kumar**  
(PHD 2011)

I am working as a Senior Process Engineer at BASF in Georgia. I am one of those using my PhD research towards meeting the goal of the

company. My research at LSU has been critical to accomplish my objectives at BASF. I am applying my LSU research experience at a bigger scale in my current role and I can correlate several similarities.



**Sophie Sumrall Dupree**  
(BS 2011)

Payton Dupree, BS AGR 2015, and I were married on March 23 at Carter Plantation in Springfield, Louisiana, and honeymooned in Italy. I work for Ford, Bacon, and Davis, and Payton is an environmental coordinator at Exxon.

## 2010



**Andrew Campos**  
(PHD 2010)

My position at Honeywell UOP is Senior Research and Development Engineer. The company I work at develops catalysts, equipment, technology, and services to the petroleum refining industries. I studied under James Spivey and learned about catalysts—what they are, how they work, and how to test and characterize them. In my current role, I focus mainly on how to scale-up and commercialize catalysts and participate in developing prototypes to test. All of this is drawing on knowledge I learned as a graduate student at LSU.



**Courtney "Eddie" Lane**  
(PHD 2010)

I am a consulting process control engineer for the chemical and petroleum industries. I specialize in the fields of advanced process control (optimal running of a plant) and procedure automation (automated startup/shutdown). The control functions I work with typically manipulate every valve in a unit operation or have a larger scope of impact. My PhD has been valuable in understanding the fundamental interactions and dependencies of process variables for these large systems. It has also provided me with the mathematic and statistical analysis skills necessary to succeed in this field.

## 2009



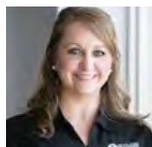
**Dewaki Chamupathi**  
(BS 2009)

I earned my chemical engineering bachelor's degree in 2009 from LSU. As a sophomore, I earned the Shell Technical Scholarship, which led to an internship with Shell as a reservoir engineer. There I helped prepare three Authority for Expenditures for recondition and re-completion projects, which earned an estimated \$1.5 million for the company. I was then hired full-time as a reservoir engineer for Shell and worked on their Brazil and Gulf of Mexico teams. There, I worked with a multi-disciplinary team of geologists, geophysicists, petrophysicists, production engineers, completion engineers, and drilling engineers to build reservoir models to optimize field development plans. In other words, we figure out where the oil is located, how much oil we can recover (get out of the ground), if it would be economic, as well as when, where, and how many wells do we drill to recover the oil. We also provide input to ensure safety in our well design and provide a worst-case discharge analysis. Unfortunately, in 2015, the oil price dropped, and I was one of the thousands laid off since our deep water projects were no longer economic.

I decided to be productive with my extra time and go back to school and pursue my master's degree in chemical engineering at the University of Houston (UH). I am currently taking my last course of the degree plan and will graduate this August. During my time at UH, I have worked as a math tutor, helping children from the ages of 4-13 master math skills and critical thinking concepts. I also had the opportunity to intern with Phillips 66 Gulf Coast Fractionators as a process engineer. My projects consisted of recommending cost-saving options to replace renting a demineralization trailer to purify boiler feed water, implementing three closed loop sample stations that would allow unit monitoring and improve operation reliability, and develop a useful tool to monitor and trouble shoot the unit.

After I graduate from UH, I hope to find another great company to work as a reservoir engineer or a process engineer. It's really the lessons of discipline, hardwork, teamwork, and resilience that the LSU chemical engineering degree gives you that is the most useful in industry. After passing those classes, you really feel that you have the confidence and ability to take on any future challenges industry and life may throw at you.

## 2008



**Natalie Guillot, P.E., PMP  
(BS 2008)**

I'm honored to carry on the LSU tradition by doing the best I can every day with Enterprise Products.

I'm currently in the role of Field Engineering

Manager utilizing my chemical engineering degree to guide and advise the design and implementation of expansion and sustaining capital projects. The LSU ChemE degree provides me with the foundation to confidently solve problems and provide me with a fulfilling career.

-LSU ChemE 2008, SWE President, Engineering College Council President

## 2002



**Chris Nichols  
(BS 2002)**

I am an attorney with McGlinchey Stafford in Baton Rouge. I was named to the Louisiana Super Lawyers Rising Stars in the area of intellectual property.

## 1994



**Sharon Hulgan  
(BS 1994)**

The return on my four-year investment in chemical engineering has been phenomenal. I learned a lot about perseverance in those years, how to keep asking questions until I understood, and how to take that knowledge and solve problems. I have used those skills in many professional capacities. I have had rich varied experiences in R&D, capital project implementation, supply chain, environmental, health and safety, and manufacturing leadership. I am currently the Site Leader for Dow's Oyster Creek assets in Texas, where I provide strategic leadership for Dow's world-scale ethane steam cracker—TX-9, the multi-feed cracker—TX-8, propane dehydrogenation plant, power generation and distribution, and Dow's hydrocarbon storage assets in Stratton Ridge.

## 1988



**Rodney Porter  
(BS 1988)**

I am the Manager and Global Process Owner (GPO) for Hydrocarbon Measurement and Accounting (HMA) Improvement Downstream Manufacturing (DSM) Support and Excellence at Shell.



**Wahyudi Budi Sediawan  
(PHD 1988)**

I am a professor in the Chemical Engineering Department at Gadjah Mada University, in Yogyakarta, Indonesia.

## 1958



**Mohan Singh Kothari  
(MS 1958)**

I live in Udaipur, Rajasthan, India, and am working for CSIR, a department in the Indian Government. I had a most fruitful time at LSU and am very keen to reconnect. I have great memories of students and faculty, particularly Dr. Jesse Coates, Dr. Dale Ursini von Rosenberg, Marcelian Gotro, and Dr. Keller.



**Arthur Kunberger  
(MS 1958, BS 1953)**

I retired from ExxonMobil and am living in Sarasota, Florida.

## STAY CONNECTED

The Cain Department of Chemical Engineering values our esteemed alumni and would like to connect with you! We would enjoy hearing about your first job, new job, promotions, accomplishments, and/or other significant events in your life. If you would like to share your achievements with us, or if you'd simply like to update your contact information, please complete our online update form at <http://www.lsu.edu/eng/che/alumni/update-alumni-info.php>. Thank you for your continued support and best of luck in your future endeavors!



## OPPORTUNITY TO GIVE

### Support LSU ChE

The Cain Department of Chemical Engineering is committed to delivering the highest possible educational experience to its students. To further that end, we invite all who would like to share in this commitment to contribute to the Chemical Engineering Development Fund. These funds are used to support instructors with industrial experience for labs; new faculty start-up costs; equipment, computers, and supplies for undergraduate labs; and numerous other endeavors.

Our alumni, friends, and other supporters are critical to the success of our department, and we are grateful for the generous gifts that we continue to receive in support of our academic programs.

You can make a gift through the LSU Foundation's secure online giving site via [www.lsu.edu/eng/che/support](http://www.lsu.edu/eng/che/support).

If you prefer to mail your gift, please make checks payable to "LSU Foundation" and note in the memo line the area you would like to support (e.g., Chemical Engineering Development Fund, Chemical Engineering Faculty Development Fund, Chemical Engineering Undergraduate Lab Support Fund, Chemical Engineering Equipment Fund, Chemical Engineering Scholarship Fund, Graduate Assistant Fellowship). Mail to:

Dr. John C. Flake, Chair  
Cain Department of Chemical Engineering  
3307 Patrick F. Taylor Hall  
Louisiana State University  
Baton Rouge, LA 70803

## *In Memoriam*



On Thursday, January 17, 2019, Lee Montgomery passed away at the age of 23 from complications of leukemia. Lee was born on October 29, 1995, in New Orleans to Rick and Penny Montgomery. He attended Patrick Taylor High School and was attending Louisiana State University where he studied chemical engineering. He also interned with Anheuser-Busch in Houston, Texas. Lee was an excellent student who took pride in his studies while remaining a fun-loving, beard-sporting, and pun-declaring man. His joy for life was evident by all who knew him. You could always count on him for a good laugh and a caring heart. He loved to watch Marvel movies, read about personal finance, cook exciting new meals, eat chocolate chip cookies, and sing and dance every chance he got. Above all else, Lee loved to spend time with his friends and his family. Even when faced with adversity, Lee found the best in all moments and remained himself: genuine, kind, selfless, and strong. He will forever be remembered by his mother, Penny; his father, Rick; his brother, Kyle; his grandmothers, Jane Robicheaux and Gloria Montgomery; the love of his life, Haley Morgan; as well as cousins, aunts, uncles, and many friends.

Thomas Ashford Jr., BS 1962  
Arthur J. Arceneaux, BS 1950  
Robert a. Gogan Jr., BS 1949  
David Francis Couvillon, BS 1958  
Stewart "Guy" Dietrich, BS 1965  
Gustavo Manuel Galdo, BS 1950  
L. Mark Gremillion, BS 1977  
Leon Clifford Kenyon, BS 1949

Lee Montgomery, Posthumous Commendation in Memoriam 2019  
Thomas Borue O'Brien, BS 1948  
Everett Rogers, BS 1957  
Jimmie Dick Sippel, BS 1955  
Edgar Ear "Butch" Spielman Jr., BS 1966  
Bruce Eugene White, BS 1949  
Walter Eichard Whitehead, BS 1964, PHD 1975

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A black and white portrait of a man with short hair and a beard, looking directly at the camera with a serious expression. He is wearing a dark jacket over a light-colored collared shirt.

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