



Department of Chemical Engineering

Fall 2021 Newsletter

Compiled and Edited by Camryn Carder ('25)

YOUNG ENGINEERS DESIGN THE FUTURE

We are excited about entering a new face to face beginning, which the administration calls “Full Flight”! There are some new stories to tell, a few changes in the air. While Dr. Venkat Padmanabhan and Dr. Stephanie Jorgenson left for the industrial sector this summer, and we wish them well, Bobby Adams has joined the faculty as instructor (welcome!). Summer brought research, with CISE students, Dr. Cindy Rice joining Office of Naval Research for a stint, and Dr. Joe Biernacki hosting an Energy-related NSF research experience for undergraduates. Dr. Pedro Arce has just won the Purdue University 2021 Outstanding Chemical Engineer Award, super congratulations!

Did you know that 15% of the world’s energy supply is spent on separations? Chemical engineers are uniquely poised to impact that number. Your faculty announce work on a new concentration, a curriculum much like the “gold standard” ABET accredited program we already offer, but with 18 credit hours difference, termed the Energy and the Environment concentration (alongside our Biomolecular concentration.) We have partners at ORNL and TVA in talks with us now about the new content. We expect to kick off Fall 2022, but in the meantime are offering an online senior level technical elective class

in the economics of changing energy infrastructure. Our faculty, including an overall lead designer Dr. Cindy Rice, have been engaged in the design of a new building; ground breaking ceremony was held September 10. The new building will be “smart,” meaning instrumented to allow classes to analyze the building, with a new outdoor environmental learning lab, and another high bay Unit Operations lab. The new high bay will include a slew of new remote-control access lab stations, the pilot of which is being beta-tested now in PRSC 101 by our Heat Transfer students.

Spring 2021, we initiated the first design coaches external to the Department, inviting alumni to join an Alumni Academy and help our student teams attack real world problems. MANY thanks go out to these coaches, who took advantage of new capabilities in Zoom and Teams to provide guidance. One team actually got to design processing for extraction of helium from moon rocks ... on the moon! Last Spring, CHE won Best Darn Major again—the 6th year in a row! The AIChE car team also won first place in the regional competition. Whatever the world throws at us, our students are still the best!

Oh yes, and don’t forget, we need your support and gifts, the CHE Department resonates because of its extraordinary alumni and students.

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AICHE AT TENNESSEE TECH: CHAPTER NEWS

The TTU Student Chapter of AIChE has already achieved many amazing things this semester. Firstly, Bobby Adams has been welcomed as the organization's new faculty advisor!

On another note, many members expressed their hopes for events that would give them opportunities to meet and mingle with other CHE students. Since COVID-19 restrictions have loosened this year, AIChE has been able to host several social events, still within safety guidelines, such as their annual picnic, an outdoor game night at the intramural volleyball courts, and a bowling night at our local Bowling World. These events have resulted in increased involvement in the organization since last year, including many first-year students! Additionally, AIChE has collaborated with the Society of Women Engineers (SWE) to host helpful career development seminars, such as a Career Fair preparation workshop with the Center for Career Development and an interview-prep presentation given by Tech alumni Alyssa Elliott.



Finally, for Chem E Car Team, preparation for Spring Regionals is in full swing. This year, the team has worked hard to recruit students from various engineering disciplines, resulting in a dynamic team of Chem E's and students majoring in Mechanical Engineering, Computer Science, and more. Brainstorming and testing for this year's chemical-powered car has begun, and we hope to see them heading to Nationals next fall! If you would like to connect with AIChE, the organization can be contacted via email: tntechaiche@gmail.com. We look forward to your involvement!

IMPROVING UNDERGRADUATE SUCCESS

by Riley Davis

We have all heard the term critical thinking, but does this skill actually make a difference to student success? While engineering students often excel in foundational courses such as calculus, they frequently struggle with applying those frameworks in the context of engineering. Can this transition be less strenuous for students who exhibit good critical thinking skills. With this in mind, a team of researchers at Tennessee Tech from the College of Engineering, Curriculum and Instruction, and Counseling and Psychology, including our department's own Dr. Joe Biernacki, recently received a National Science Foundation (NSF) grant award to study engineering student success rates after deliberately training first-year engineering freshmen to think critically.

Past studies focused on improving critical thinking, but have not considered how those skills impact student success. Contrarily, this research team plans to do just that. The TTU team is conducting this experiment with first-term students in both Chemical Engineering and Electrical Engineering by assessing the academic performance and retention rates of students who are given this new training versus those using the traditional curriculum. The TTU team also plans to broaden the impact of their research by offering critical thinking training to high school teachers in the Upper Cumberland region. Overall, this new research hopes to strengthen student performance within the Department and the College and answer the glaring question: does thinking critically skill training improve student success?

The Renaissance Foundry Research Group

A group of faculty and associated collaborators from the Chemical Engineering (ChE) department at Tennessee Tech have been very active in implementing service-learning activities for undergraduate students in the program and other STEM disciplines across campus. Members of the Renaissance Foundry Research Group (RFRG), including Drs. Pedro Arce (ChE), J. Robby Sanders (ChE), Andrea Arce-Trigatti (Education), and Stephanie Jorgensen (ChE) in collaboration with the Rural Reimagined Institute and the Millard Oakley STEM Center have developed enrichment programs and learning experiences guided by the Renaissance Foundry Model (herein the Foundry) for students, focused primarily on increasing the retention and success of those from underrepresented populations. This collaborative work with colleagues from across the university in developing and implementing the Foundry has resulted in four successful programs that have received funding from state and private funding:

- **The STEM Foundry Heritage Fellows program (STEM FHF):** PI - Dr. Arce-Trigatti, Co-PIs - Dr. Arce, Dr. Jorgensen, and Dr. Sanders, Mr. Galindo (STEM Center) and Dr. Darek Potter (STEM Center). Funded by the State of Tennessee Board of Regents (TBR) Student Engagement, Retention, and Success (SERS) grant.

- **The Foundry Undergraduate Engaged Learners program (FUEL):** PIs - Drs. Arce-Trigatti and Sanders, Co-PIs - Drs. Arce, Dr. Jorgensen, and Mr. Aikins (Rural Reimagined Institute). Funded by the State of Tennessee Board of Regents (TBR) Student Engagement, Retention, and Success (SERS) grant.

- **Science Olympiad Collegiate Scholars (SOCS) program:** PI - Mr. Galindo (STEM Center), Co-PIs - Drs. Arce-Trigatti, Jorgensen, Collaborators: Drs. Arce and Sanders. Funded by the State of Tennessee Board of Regents (TBR) Student En-

gagement, Retention, and Success (SERS) grant.

- **BioFoundry Design: Leveraging Biomimicry to Advance Environmental and Social Sustainability Innovation in Prototypes Developed in Foundry-Guided Undergraduate Chemical Engineering Courses:** PI – Dr. Arce, Co-PIs – Drs. Arce-Trigatti, Sanders, and Jorgensen. Funded by the VentureWell Foundation.

These programs have expanded the use and understanding of the Foundry and have offered promising results in terms of student retention and success within STEM majors. Students not only gained exposure to research practices early in their academic careers, but also made vital connections to their majors that resulted in professional development opportunities outside of the programs. Graduates of the STEM FHF and FUEL programs, for example, have successfully competed in the TTU Creative Research and Inquiry Day as well as published for the American Society of Engineering Education (ASEE) and presented their work at regional and national conferences.

Further, the research and professional contributions of the RFRG members have resulted in national and university level recognitions. Drs. Sanders, Arce-Trigatti, and Arce received the prestigious 2021 Thomas C. Evans Outstanding Paper Award from the Southeastern region of the ASEE. The work recognized a contribution from the authors published in the Education for Chemical Engineers, from the IChE, United Kingdom, which used statistical analysis to understand students' problem identification skills from a course that adopted the Foundry to guide students in identifying educational challenges that were socially impactful. Dr. Arce received the very prestigious 2021 Outstanding Chemical Engineer Alum Award from the Davidson School of Chemical Engineering, Purdue University, for his forward-thinking efforts in identifying a "new type of engineer". This award recognizes over two decades of commitment to

(cont'd, from Faculty Collaboratin Success)

student learning and the contributions to the field of engineering education. Please see a complete description at: [Dr. Pedro Arce 2021 Outstanding Chemical Engineer Alum Award - Rural Reimagined Grand Challenge \(tntech.edu\)](#). Drs. Arce-Trigatti and Jorgensen were distinguished with the 2021 Sissom Award from the TTU College of Engineering for their pioneering efforts in updating the Professional Ethics Course of the ChE curriculum. This course was supported by a Quality Enhancement Plan grant from TTU and leveraged design thinking to innovate collaborative learning practices in the development of student ePortfolios for the course. Fi-

nally, Dr. J. Robby Sanders received the 2021 Tennessee Tech Outstanding Teaching Award for the second time in his career for outstanding and compassionate efforts during the COVID-19 pandemic, which assisted ChE students to continue with their education during an incredibly difficult year.

These well merited recognitions honor the work and dedication of this group of educator-scholars to both the advancement of student success in ChE as well as the continual improvement of the curriculum to be well-aligned with development of a holistic engineering professional. Congratulations to all and thank you so much for your dedicated efforts to our students.

F A C U L T Y

F O C U S

Dr. Ghorashi Makes Top 100 Best Seller List

The Department of Chemical Engineering now boasts a Top 100 Best-Selling author. Dr. Ghorashi's book, "How to Become an Exceptionally Successful Young Person: A Guide to Early Planning and A Roadmap to Success" is now listed on Amazon's top 100 Best Seller's list in the "Best Sellers in Teen and Young Adult Archaeology" category. Dr. Ghorashi's

book is written to prepare young people for the challenges they will face in their lives. On making the Best Sellers list, Dr. Ghorashi says, "As an educator, I am delighted that the book has received such a positive acceptance by young people that we are trying to educate, mentor and support on a daily basis." Dr. Ghorashi's book can be purchase on Amazon [here](#).

A L U M N I

S P O T L I G H T

Chemical Engineering Alumnus Goes 'Back to the Past'

Steve Desirey, '70 chemical engineering, had the opportunity to visit with two professors—David Yarbrough and John McGee—who changed his world.

"Getting to visit your professors from half a century ago would make a good movie. Call it 'Back to the Past.' I have to

admit, it seemed like a wild idea in the beginning, but it was a good feeling to thank someone for what

they did 50+ years ago. Those two made a difference in my life, as did many of my professors at Tech. Of course, my dad was the motivator, but it took the knowledge transfer that the Chemical Engineering Department provided. It all worked."



Pictured from L to R: David Yarbrough, Steve Desirey, and John McGee

Alumnus Added to Board of Advisors

Reed Mullins ('02) is being added to the Chemical Engineering Board of Advisors for his expertise in the field of Chemical Engineering. Mullins has been recognized over the years with several awards and recognitions, one of those being *Knoxville Business Journal*



“40 under 40” honoree in 2017. Mullins works as the Senior Director of Y-12 Production Operations. The Department of Chemical Engineering at Tennessee Tech is excited to have Mr. Mullins join the Board of Advisors. The Board of Advisors helps the Department to remain on the cutting edge of engineering education.

STUDENT

SPOTLIGHT

ChemE Students Shine at TAS Conference

Two Chemical Engineering students here at Tech received awards from the Tennessee Academy of Science (TAS) Conference. Kathlyn Mealio and Katherine Slamen both brought home top awards. Kathlyn Mealio ('22) received 2nd



L to R: Kathlyn Mealio & Katherine Slamen

place in Oral Presentation in the Chemistry section. Katherine Slamen ('23) received 1st place in Poster Presentation for the Engineering and Engineering Technologies section. The Tennessee Academy of Science Annual Meeting was held on November 6th, 2021 at Tennessee Tech.

Grad Student Wins 2nd Place in American Fisheries Society

Dennis Piercy is a Master's student in the Chemical Engineering Department. Piercy won the 2nd place prize for his presentation at the 2021 American Fisheries Society meeting. He presented about the joint research effort between the Water Center and the Chemical Engineering department for producing a nitrogen stripping/oxygenating column for fish hatcheries that would help our rural ecosystems. Dr. Jeff Schaeffer and Dr. Holly Stretz mentored Dennis throughout the project.



Regarding his project and presentation, Dennis stated, “This opportunity really has been so unique due to the interdisciplinary cooperation between chemical engineering and the Water Center. I took a chemical engineering design and presented it to fish specialists effectively, and I was so happy that people were interested in the research. This has been an amazing experience that has expanded my knowledge and skill sets as I transition from academia to industry.”

Grounding Breaking on New Engineering Building

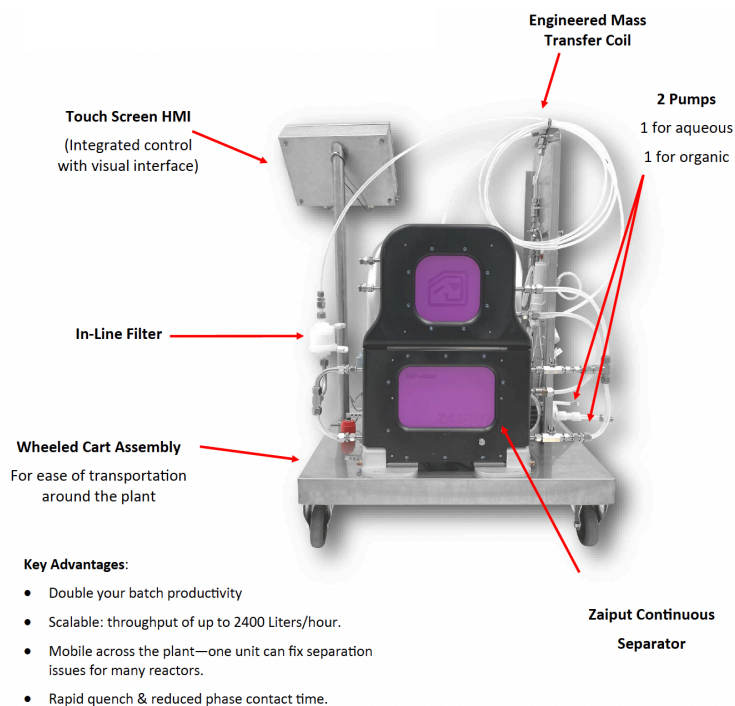
Tennessee Tech broke ground on its new 100,000 square foot Ashraf Islam Engineering Building on September 10, 2021. The new building will be right across the street from the home of the Department of Chemical Engineering, Prescott Hall. The \$62 million Ashraf Islam Engineering Building will further improve the engineering programs Tennessee Tech is famous for. Pictured here, the

groundbreaking for the new building took place in Sherlock Park, across the street from Prescott Hall.



WE NEED YOUR SUPPORT

The Department kindly asks for your donations and support. We are trying to purchase an in-flow mixer to bring to recruitment events for Chemical Engineering at Tech. The piece of equipment is pictured here. Being able to purchase this in-flow mixer would help to cultivate interest in Chemical Engineering at Tennessee Tech. The equipment is captivating and would certainly draw attention to our booth at recruitment events. Thank you in advance for your kind donations. Please see the steps and link to donate to Chemical Engineering below.



SEE HOW TO DONATE BELOW!

How to Donate to Chemical Engineering at Tech

MONETARY GIFTS BY CARD:

Step 1) Scan the QR code below or go to <https://www.tntech.edu/engineering/support.php>

Step 2) Choose “**Chemical Engineering**” under “What part of Engineering do you wish to support?”

Step 3) Choose your gift amount.



MONETARY GIFTS BY CHECK:

- Make your check payable to the **Tennessee Tech Foundation**
- Indicate on the memo line: **CHEMICAL ENGINEERING**
- Mail your gift to:

Tennessee Tech University

TTU Foundation

Box 1915

Cookeville, TN 38505

