

# THE COLUMN

MCKETTA DEPARTMENT OF CHEMICAL AND BIOPROCESS ENGINEERING NEWSLETTER

## From the Chair

I hope this newsletter finds you in good health and high spirits. As the new chair of the McKetta Department of Chemical & Bioprocess Engineering I find myself reflecting on the extraordinary growth and transformation we have experienced over the last 29 years since I first started.

What began in classrooms that looked like 1960's era construction trailers has blossomed into state-of-the-art facilities. Our evolution has been immensely gratifying, but what has remained constant is our tradition of attracting great students and working with extremely resolute and talented educators. I want to take a moment to highlight some of our remarkable achievements:

**Faculty Excellence** – Allen Hersel is an author of one of the world's premier books in Chemical Engineering "Transport Processes and Separation Process Principles". This year alone Amanda Malefyt was promoted from Associate Professor to Full Professor and won the Barrenbrugge Award for Faculty Excellence.

**Student Success** – I really cannot say enough about our students and alumni. Our students have become competitive every year in national contests, and this

year was no exception. Over the years they have won a staggering number of national and regional awards, competing against the very best programs in the country. That, along with the outstanding contribution of our alumni is a true reflection of the quality educational experience here in the McKetta Department.

**Undergraduate Research** – The instrumental role played by Jacob Borden, Amanda Malefyt, Allen Hersel, and Jeff Raymond in starting the undergraduate research program has added a new dimension to our curriculum. A truly outstanding effort.

These accomplishments, coupled with the leadership of Amanda Malefyt as chair since 2015 and the support of our entire team, have shaped a nationally recognized program. I really do appreciate her steadfast leadership of the department over the years. She has done an outstanding job.

I extend my heartfelt gratitude to Amanda, Allen, Jacob, Jeff, and Casey Mussatti for their unwavering commitment to excellence. Their collective efforts have created a truly remarkable department that stands as a beacon of teaching excellence. For Undergraduate education in Chemical Engineering, I really do not know of a better place.

As we celebrate our past and look

to the future, I am filled with excitement and optimism about the continued growth and success of our department. I invite you to join me in embracing the promising opportunities that lie ahead and welcome you back anytime.

Sincerely,

John Wagner — Chair, McKetta Department of Chemical & Bioprocess Engineering



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SUMMER 2023

## Faculty Awarded Four Grants in '22/'23

Over the past two years, the chemical engineering department has been awarded four grants to expand opportunities available to ChE students and supplement rising office, travel, and lab equipment costs.

The department was awarded (\$20,000) from the McKetta Charitable Foundation. Funds were used to renovate a small lab room into a student study and presentation center and prepare materials for an outreach project. The study includes four computer stations, bar top study spaces, a large conference table and group workspace, whiteboard, projector, and kitchenette. The space has been used as a gathering location for junior students when seniors "take over" the computer lab, pre and post lab presentations, and hosts PAB meetings and group visit days. The other portion of the grant was used to build multiple, modular, pipe flow scaffolds for use in unit operations lab courses as well as the potential for high school outreach visits.

Jacob Borden and Amanda Malefyt were awarded a 2022 Indiana Space Grant Consortium (INSGC) Grant (\$11,500) for monoclonal antibody production undergraduate research. The grant allowed the purchase of supplies and undergraduate research students the opportunity to develop the techniques necessary to design a plasmid and produce cancer-targeting monoclonal antibodies using Chinese Hamster Ovary (CHO) cells. Senior students Omar Flores and Jeffrey Feehan were selected as lead researchers for the project and successfully presented their work at the AIChE Student Regional conference, receiving awards for their presentations.

"The research opportunity to me represented an opportunity to learn. I have wanted to work in some aspect of pharmaceuticals, the research conducted allowed me to get a feel for what this meant and opened my eyes to the benefits of pharmaceuticals. It

has impacted my career plans by solidifying the industry that I believe I will make the most difference in," stated Flores.

Feehan agrees, "I have been able to expand my understanding of mammalian cell research and further develop my critical-thinking, problem-solving, and analytical skills. This opportunity has created a passion for research and has solidified my commitment to making meaningful contributions to my field of interest. Additionally, by being provided with such an opportunity, the faculty have showcased their commitment to innovation and knowledge, allowing students to gain a deeper understanding in their respective programs."

John Wagner and Amanda Malefyt were awarded a 2022 Computer Aids for Chemical Engineering (CACHE) Grant (\$5,000) entitled, "QRProblems.org: Open-Sourced System for Variable Parameter Quantitative and Qualitative Engineering Problems." The project works to update and promote [QR-ED.org](https://www.qr-ed.org), a suite of tools for increased student learning which is freely available to all educators. Funds for the grant have also supported faculty travel to present at conferences. John Wagner presented a poster at the AIChE

National Conference in Phoenix, "Increase Recycle to Reduce the Purge: A System to Improve Curriculum Retention" and Amanda Malefyt co-presented a workshop at the KEEN Conference in January, "Visual, Creative, Student-written Problems for any Course." This project also promotes outreach to middle and high school aged students.

Most recently, Allen Hersel was awarded a 2023 Parker Hannifin Corp. Grant (\$2,000) for, "Implementation of a High Polymer Process Laboratory Course." These funds will go toward developing a new lab component for the High Polymer Processes course. Materials and equipment useful to this laboratory include Ostwald viscometers, gel permeation chromatography (GPC) columns, extrudate samples of different polymer types, and materials for synthesizing different types of polyesters. Adding a hands-on component to the course will further grow the polymer knowledge base of our students. In addition, simplifications of the experiments used in this upper-level class will be applied to introductory engineering courses and used as demonstrations for outreach events related to career possibilities in engineering.







## Teams Excel at National Student Conference

Thirteen Trine University students took part in competitions at the annual American Institute of Chemical Engineers (AIChE) Student Conference, held Nov. 11-14 in Phoenix, Arizona.

Trine's Chem-E-Car finished fourth in its event, while the ChemE Sports team finished eighth and the university's ChemE Jeopardy team advanced to the semifinals, which included the top nine teams.

"The teams put in significant time preparing for their competitions, and this dedication resulted in impressive representation of our program and university. We were small but mighty," said Amanda Malefyt, Ph.D., chair and associate professor in Trine's McKetta Department of Chemical and Bioprocess Engineering.

### Making do

Chem-E-Car team members were captain Parker Gillespie of Solsberry, Indiana; David Deniston of Bowling Green, Ohio; Travis Mersing of Swanton, Ohio; Dean Campbell of Batesville, Indiana; Natalie Crowner of Saline, Michigan; Madison Ruen of Antwerp, Ohio; and John McClelland of Oak Forest, Illinois.

In the Chem-E-Car competition, teams must build a car that starts

and stops using only chemical reactions. Trine's team had to make last-minute adjustments to their car, dubbed the "Rolling Thunder," after discovering the chemicals they needed to power the vehicle had not arrived in Phoenix.

"AIChE had only received about half of the chemicals that all 35 teams had requested," Gillespie said, noting this issue affected more than half the competitors. "We did not find out until Saturday afternoon, and the competition was on Sunday."

The team was able to find a substitute for one of its battery chemicals, and ran experiments to determine another chemical that would provide a functional reaction.

Once the team had the reaction, they had to determine the new speed of the car and best ratio of chemicals while addressing any possible safety concerns.

"Placing fourth was an amazing achievement in general, considering all the challenges we had to overcome just to have a functional car," Gillespie said.

### Industrial simulations

In the Chem Esports competition, teams run a simulation of an in-

dustrial process. The event featured a distillation column this year, with teams attempting to correct errors in order to bring the simulation out of alarm state and to continue earning money.

Trine's team was comprised of Matthew Decker of Bluffton, Indiana; Mutlaq al Mutlaq of Saudi Arabia; and David Deniston.

Trine competed against universities from other nations as well as larger schools including the University of Virginia, Iowa State University, the University of California Irvine, the University of Texas at Austin and Yale University. The team placed fourth in the first round and third in the final round, which earned an Ultimate Controller Award.

Trine was eighth overall.

"With the exception of the second round, in which we were a little slow racking up points in the beginning, we quickly recognized and addressed all the unanticipated failures, and our scores reflected this," said Decker.

### This. Is. Jeopardy.

ChemE Jeopardy covered chemical engineering subjects such as thermodynamics, mass transfer and reaction kinetics. The contest

*(continued on pg 7)*

# AIChE Regional Awards

Fourteen Trine University chemical engineering majors took part in American Institute for Chemical Engineering (AIChE) regional competitions March 30 and 31 at the University of Illinois at Chicago, winning multiple awards.

The university's ChemE Car team placed second in a field of 13 teams to advance to national competition.

Trine team members Parker Gillespie of Solsberry, Indiana, David Deniston of Bowling Green, Ohio, Christopher (Dean) Campbell of Batesville, Indiana, Natalie Crowner of Saline, Michigan, and Travis Mersing of Swanton, Ohio, were solidly in the lead at the end of the first run.

Their car finished 1.5 feet from the target of 65 feet. However, reigning national champion University of Toledo pulled out a strong last run to win.

The Trine team's finish qualifies them for the national competition in Orlando this fall.

"I'm so proud of this team," said Gillespie, the team captain. "Going into the competition, we were confident about the chemistry of the car, but anxious about a new stopping mechanism delivery system which was a result of a recent rule change. We were all joyous to have a consistent performance and qualify for a fourth consecutive national competition."

Trine's ChemE Jeopardy team also finished second, competing in a field of nine schools, also advancing to national competition.

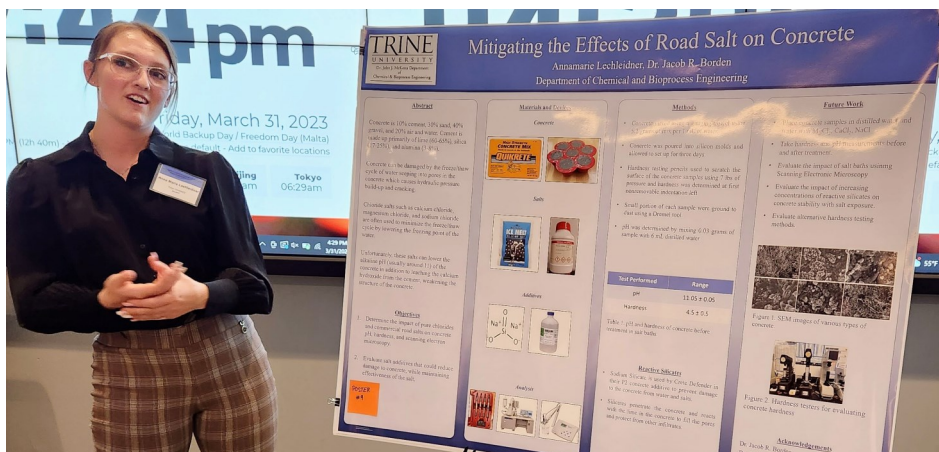
The team won its first round to advance to the finals, finishing second to the University of Akron. Team members were Jake Doyle of Marengo, Illinois, who served as captain, Zaavan Clear of Auburn, Indiana, Aaron Phillips of Marengo, Illinois, and Deniston.

"It was definitely bittersweet to be playing on the Jeopardy team for the last time at regionals," said Deniston, who graduates in May. "I am comforted, though, that this marks our second regionals in a row making an appearance in the final round. I think that the team is starting to have the expectation of success instead of merely hoping for it. They are highly talented and I think they will continue to see success."

Several Trine students were honored for research they presented.

Omar Flores of Ligonier, Indiana, received second place in the student technical paper competition. Flores gave a talk on his work, "Harnessing the Immune System: Targeted Treatment for Colon Cancer through Monoclonal Antibodies."

*(Continued on pg 7)*



Annamarie Lechleidner received second place in the undergraduate research poster session.

# Industry Projects

A key mission of the department is to prepare our students for employment. One of the most effective ways to accomplish this is through mutually beneficial company sponsored projects. We would very much appreciate your organization's participation in our senior capstone projects.

Here are some guidelines to consider for our industry-sourced senior projects:

- Project teams consist of 3 to 4 students and should have a significant engineering work scope.
- Students work about 1-3 hours per week until end of November to develop project scope, deliverables, milestones and schedule.
- Students work about 5-7 hours per week starting in January on execution of the project.
- We ask that there be someone from your company who can serve as a mentor to share necessary data and information about the project, host a plant tour / site visit, and provide feedback to students as needed.
- Projects are presented at the Engineering Design Expo, the last Friday in April.

Recent projects include:

Carbon Dioxide Capture from Mixers, Chapman's Pasteurizer Design, DuPont Heat Exchanger Analysis, POET Variable Frequency Drive Pump Analysis, and Solvent Delivery and Recovery for a Pharmaceutical Company.

If you are interested in learning more, please reach out to Jacob Borden, [bordenj@trine.edu](mailto:bordenj@trine.edu).

Thank you in advance for your help providing these opportunities for our students.



# Positive Reaction: High School Students Learn Chemistry Applications at Trine

Sixty-six high school students from six local schools enjoyed a day of chemistry- and chemical engineering-themed activities at a new Trine University event titled, "On TrAC: Trine Applications in Chemistry."

Hosted by the McKetta Department of Chemical and Bioprocess Engineering and Department of Chemistry, the program took place Thursday, March 23.

The university invited high school Advanced Placement or dual credit Chemistry teachers to bring their advanced science classes to campus for the day.

Students rotated through activities that included designing hands-on separation processes, seeing undergraduate research projects performed in chemistry and chemical Engineering labs, playing a Chemistry-themed Jeopardy game and speaking with college students majoring in the chemical sciences.

Running concurrently with the student events were seminars for the instructors with ideas for simple demonstrations and lab experiments and online resources for teaching AP and dual credit chemistry.

"The goal of this visit is two-fold: one, an outreach event to get junior and senior high school students excited about how they can apply chemistry to careers in chemistry or chemical Engineering, and two, build connections and

Students competed in Chemistry themed jeopardy (*top right*), observed mini bioreactors, and designed their own water purification systems (*right*).

provide resources for high school teachers," stated Amanda Malefyt, Ph.D., event organizer and chair of the McKetta Department of Chemical and Bioprocess Engineering.

"I enjoyed watching the high school instructors and Trine faculty exchange ideas for the best ways to teach chemistry. At the same time this was occurring, students were learning about how the chemistry principles they learn in high school translate into real world chemistry and chemical engineering careers," commented Vicki Moravec, Ph.D., chair of Trine's Department of Science.

In addition to chemistry and chemical engineering faculty, about 20 Trine University students from Omega Chi Epsilon, the chemical engineering honor society, assisted in planning and hosting the student sessions.

"My kids and I had a great time, and chemical engineering made quite an impact on one student in particular. We hope to attend again in the future," commented Lisa Franks, science teacher at Bronson Community schools and 2008 Trine chemistry alumna.

Students from Bronson Jr/Sr High School, Pansophia Academy, Litchfield High School, Camden-Frontier High School, Central Noble High School and Jonesville Community Schools attended.



## Become an AIChE sponsor

As president of our AIChE student chapter, I invite you to consider becoming an industry sponsor of our chapter.

This fall, 16 students will attend the AIChE Annual Student Conference in Orlando, Florida, to compete in the ChemE Car, ChemE Jeopardy, and ChemE -Sports competitions, as well as the undergraduate research competition. Conference registration, hotel, and airfare costs have risen significantly, now totaling around \$16,000/year.

Sponsorship opportunities range from \$100—\$1000+, with varied levels of recognition, and any donation is greatly appreciated. Checks can be made out to *Trine University Chemical Engineering - AIChE*. Online payments are also accepted through: <https://secure.trine.edu/trine/payments/> (Please select "Other" and specify *Chemical Engineering - AIChE*).

Thank you in advance for any support you can provide.

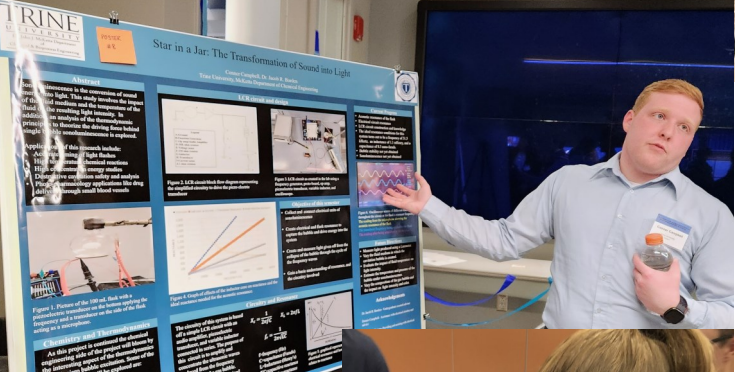
Cordially,

Dean Campbell





# Highlights From The Academic Year





## In The News

Chemical Engineering students are actively involved throughout campus. For more information on the success of our students outside of chemical engineering, check out these links below.

- May 2, 2023 – [Trine pairs compete in collegiate bridge tournament](#) (Isaac Braun, Cameron Orr)
- May 1, 2023 – [Trine inducts 77 into order of the engineer](#) (Mutlaq Al Mutlaq, Chase Braxmaier, Cameron Comte, Elizabeth (Grace) Curtis, Jeffrey Feehan, Omar Flores, Ellen Goff, Elaine (Lainie) Kuckahn, Andrew Michalowski, Gabe Smith, Meg Yerrington)
- April 20, 2023 – [Trine choir holds spring concert](#) (Noah Glassman, Abby Hansen, Aaron Phillips)
- March 13, 2023 – [Civanich Tallies Fourth Athlete of the Week Award of the Year](#) (Mark Civanich)
- March 08, 2023 – [Big Man on Campus raises more than \\$25,000](#) (Parker Gillespie)
- February 1, 2023 – [Trine Bridge Club hosts local groups](#) (Isaac Braun, Keely Brooks, Brooke Hardy)
- January 13, 2023 – [Team finds Ecuadorian village has water in abundance thanks to Trine EWB project](#) (Madison Ruen)
- December 20, 2022 – [Trine inducts 5 into Order of the Engineer](#) (Abdullah Alhosawi)
- December 3, 2022 – [Personal best for Randolph in the 5000-meter run at Wittenberg](#) (Lydia Randolph)
- October 5, 2022 – [Three Receive All-MIAA Awards and Civanich Named MVP on Final Day of MIAA Championships](#) (Mark Civanich)
- September 19, 2022 – [Grant funding Trine research to help make space travel safer](#) (CJ Elston)

## E-week Champs

The McKetta Department of Chemical and Bioprocess Engineering earned the most points during Engineering Week to take possession of the traveling trophy.

The departments within the Allen School of Engineering took part in competitions throughout the week of Feb. 20-24, including banners, putt-putt, drone racing, textbook toss, Smash Bros., foundry, giant skee ball and corn hole.

The chemical engineers took top honors with 645 points, followed by the Wade Department of Mechanical and Aerospace Engineering with 620 points and the Department of Design Engineering Technology with 600 points.

(Nationals, *cont. from pg 3*)

also included general STEM categories such as math, physics and chemistry, and one wild card category in each round such as children's TV, Disney or insects.

Team members Adam Dumas of Wauseon, Ohio, Matthew Decker, David Deniston and Dean Campbell competed against Western Michigan and the University of Southern California in the first round and Virginia Tech and the University of Maryland Baltimore County in the semifinal.

UMBC defeated Trine in that round and went on to win the tournament.

"Even though we didn't win the whole tournament I was very happy with our placement," said Dumas, the team captain. "We practiced very hard and made it all the way to the semifinals of a national tournament."

"The support from the department and the other students during the competition in Phoenix was great. I think it shows that great sense of community in the chemical engineering department at Trine."

## Individual awards

Two Trine University chemical engineering students received awards honoring students who stand out in their individual chapters.

Natalie Crowner received the Freshman Recognition Award. The award is presented to one active AIChE undergraduate student member in each student chapter who has been the most active in their chapter during their freshman year, on the recommendation of the student chapter advisor.

Alyssa Keptner of Midland, Michigan, was recognized with the Donald F. Othmer Sophomore Academic Excellence Award. That award is presented to the active AIChE undergraduate member in each student chapter who has attained the highest scholastic grade-point average during their freshman and sophomore years, on recommendation of the student chapter advisor.

(Regionals, *cont. from pg 4*)

"I am passionate about this research topic because it demonstrates how the human body's natural defense mechanisms can be exploited to fight off diseases, exemplifying how extraordinary the human body is and how an understanding of the human body can bring a positive impact," he said.

Five Trine students presented undergraduate research posters.

Annamarie Lechleidner of Defiance, Ohio, received second place for her poster, titled, "Mitigating the Effects of Road Salt on Concrete." Jeffery Feehan of Sparks, Nevada, earned third place for his poster, titled "Harnessing the Immune System: Optimization of Panitumumab antibody production in CHO cells."

"I fell in love with the practical aspects of immunological research, using engineered biosystems to target diseases using our body's immune system," Feehan said.

# Thank You For Your Support

We are beyond thankful for the level of giving achieved by Chemical Engineering alumni. We acknowledge the following alumni, supporters, and organizations for contributing to the university and ChE department during the past academic year. Your donations provide scholarship opportunities, help students attend conferences, purchase new lab equipment, aid in undergraduate research, fund outreach activities and support department social events.

## ChE Alumni Donors to Trine University

David Anderson, David Bacehowski, Jon Bagley, Christopher Barr, Tyler Boscoe, James Bramley, Charlotte Brent, Kaitlyn Brock, Howard Caine, Nicholas Cassidy, Joshua Chapman, Robert Chimney, Eric Chris, Brandon Collins, Breann Cooper, Gerald Denson, Jr., Adam Dills, Alicia Eavey, William Eckstrom, Drew Furman, Christopher Goebel, Gregory Goodridge, Teresa Grant, Ryan Gruell, Jonathon Guscinski, Brooke Hardy, Blaine Harvey, Andrew Hein, Jacob Honkomp, Robert Huba, Nicholas Ihrie, Joseph Jackson, David Keptner, James Kerr, Caleb Knust, Danny Koester, Lucas Krupp, Donald Kuhn, Robert Leach, Richard Linard, Amanda Malefy, Joshua Martin, John Mastarone, Robert Mauck, Meghan McGonagle, John Miller, Nicholas Miller, Patrick Mills, Sr., Richard Mohler, Dru Nelson, Nada O'Brien, Cameron Orr, John Owen, Myron Perry, Valerie Pompa, Raymond Rickert, Lynn Rohrbaugh, Christopher Sanchez, Andrew Schmidt, Glenn Schmidt, Edward Schulz, Brandon Shearer, Donald Shenefiel, Bruce Smith, Laurel Smithson, Marc Snyder, Albert Steele, Jason Stofleth, Adam Taloni, Avery Taylor, James Taylor, Prescott Van Horn, Alec Wallisch, John Wiedenman, Patrick Wong, Laura Wright, Lester Wyborny, II, Mitchell Wyss, Brittany Zembala

## Donors to Chemical Engineering

Teresa Grant, Brooke Hardy, Linda Machek, Amanda Malefy, Meghan McGonagle, Pamela & Patrick Mills, Casey Mussatti, John Owen, Chet Pinkham, Majid Salim, Avery Taylor, Eric Taylor, Prescott Van Horn, Dianna Whorley

## Company Gifts to Chemical Engineering

American Online Giving Foundation, Helen and John McKetta Jr. Charitable Foundation, Pfizer, Shambaugh & Sons, Steuben County Community Foundation, The Medtronic Foundation

## Equipment and Facility Updates

We moved into our brand new SDI Tissue and Bioseparations labs January 2023. These new lab spaces double our chemical engineering bio-related facilities. New equipment for these labs includes water purification systems, an additional biosafety cabinet, lab grade refrigerator, nanodrop, and automated cell counter. Future wishes include: freeze dryer, large centrifuge, high pressure/temperature reactor, inverted fluorescent microscope with analysis software, and an analytical HPLC system.

In Fawick, we have renovated the ChE office space and the university is modernizing the hallways and classrooms. Next on our list of major Fawick improvements is refreshing the appearance of the Moore Lab.

To continue the momentum we have experienced, it will take many gifts of all sizes. To learn more about supporting Trine and Trine ChE, contact the Trine University Office of Advancement, [advancement@trine.edu](mailto:advancement@trine.edu).

