

# The University of Iowa

EDITOR: Jessica Schroeder

AICHe Fall 2021

## Advisor's Corner

By: Prof. David Murhammer, Professor and AICHe Student Chapter Advisor

Greetings to Hawkeye Chemical Engineers!! During the Fall 2021 semester all departmental courses (except web-based courses) were held in person, including the Chemical Engineering Professional Seminar (CBE:3000). It was particularly pleasant to have the seminar in person again after almost a year of Zoom-based presentations. The COVID-19 pandemic did result in some disorder with students missing class due to positive diagnoses. After being at the mercy of the pandemic since March 2020, the students and faculty are looking forward to the official end of the pandemic.

The 2021 AICHe Annual Student Conference was held in person November 5-8 in Boston, Massachusetts. It was refreshing to have an in-person conference again after a virtual meeting in 2020. Nineteen students and the AICHe Faculty Advisor (me) attended this meeting. The highlight of the meeting was watching our ChemE Jeopardy team dominate the competition and win the national championship (see the corresponding article in this newsletter). This is the fourth time that a University of Iowa team has won the ChemE Jeopardy Competition (they also won in 2013, 2014 and 2020) in the 11 years of the competition. No other university has won more than once. Congratulations to the 2021 championship team members Dimitri Gatzios, Mason Lyons, Collin Sindt, and Darrell Smith! The University of Iowa student chapter also won other national awards, including the 2020-2021 Donald F. & Mildred Topp Othmer Scholarship Award (Nolan Burson), Chevron 2021 ScaleUp Sponsor Essay Question winner (Anthony Wagner), Minority Affairs Committee's Minority Scholarship Award (Edgar Salinas) and 2020-2021 AICHe Outstanding Student Chapter Award.

This Fall 2021 issue of our AICHe Student Chapter Newsletter begins with an article that reviews the semester's activities. This issue also includes articles about (i) the ChemE Jeopardy competition, (ii) the 2021 AICHe Annual Student Conference, (iii) an undergraduate research experience, (iv) the Chevron Essay competition (including the award-winning essay), (v) the Kids' Day Camp, (vi) the OXE nitrogen ice cream sales, (vii) a co-op experience, and (viii) ChemE Comics.

Thanks for reading! Comments about the newsletter content can be sent to me at [david-murhammer@uiowa.edu](mailto:david-murhammer@uiowa.edu).



## University of Iowa American Institute of Chemical Engineers

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## A Semester in Review— Jessica Schroeder

With the return to mostly in-person classes this fall, the AIChE chapter set out this semester to welcome students back with a variety of activities to engage and connect ChemEs of all ages. Our social chair, Isabella Saccone, planned multiple events throughout the semester to engage ChemEs outside of the classroom. She planned a potluck in City Park where members brought a variety of sides to share and played yard games in the park. She also planned a kick boxing night where members went to a local kick boxing gym and got to learn and practice new moves while getting an awesome workout and study break. Lastly, before Thanksgiving Break, she planned a bowling night at Colonial Lanes, where members could showcase their bowling skill and play mini golf at the bowling alley's course.



*AIChE Members at our Kick Boxing Event*

Our student mentor program also made an exciting return to campus. Our vice president Nina Laszkowiecki paired a variety of upper and underclassman to help underclassman navigate college life. Along with monthly mentor-mentee check ins, Nina also planned events to help all mentors and mentees connect as well. Nina planned a Bob Ross painting night where mentors and mentees followed along with Bob Ross to create a landscape scene. She also planned a laser tag night, movie night, and trivia night as well, which were well attended by mentors and mentees alike.



*AIChE Members at our Bob Ross Painting Event*

We also had two volunteer events for our members to take part in. Our volunteer chair, Nolan Burson, coordinated a trash pickup on the west side of campus and a box of balloons event. The box of balloons is a non-profit in which volunteers collect and create birthday decorations and donate them to ensure that every child's birthday can be celebrated even if their family cannot afford it. Our box allowed a family to celebrate their daughter's second birthday without the burden of having to buy decorations. Lastly, we also could have our Kid's Day camp in person again, where we had one of the largest number of participants in the event's history. Overall, our board did an amazing job planning events for our members to connect with each other and connect with our community. We look forward to the Spring semester and the events that our new board will plan.



*AIChE Members at our Trash Pickup Event*

## ChemE Jeopardy National Champions— Darrell Smith

On Saturday, November 6th, and Sunday, November 7th, the University of Iowa team competed in, and won, the chemical engineering jeopardy national championship, held in Boston, MA. The team – known as the Dinklebergs – consisted of Darrell Smith, a junior in chemical engineering, and three Iowa alumni: Collin Sindt, Dimitri Gatzios, and Mason Lyons, who had previously won the national championship in 2020. Collin, Dimitri, and Mason are now the first participants to have won the championship in two consecutive years.

The team originally qualified for the national championship after placing first in the regional competition in April and practiced weekly in the leadup to the competition. The practice certainly paid off – the team answered questions from categories including process safety, unit operations, separations, transport, biochemistry, and even US national parks.

During the final round, Iowa competed against University of Maryland, Baltimore County, and in an ironic twist of events, Iowa State University. During the first half of the championship round – which was now a CyHawk game – Iowa and Maryland were equally paced for points, but with the advent of double jeopardy Iowa tore into the lead, eventually earning more points than ISU and UMBC combined.

The final scores were 14,200 for Iowa, 2,700 for UMBC, and 2,600 for ISU.

After winning the championship the entire Iowa crew went out to celebrate with dinner at the BeBop, an Irish pub with live music. The championship win was a fitting culmination for the countless hours of studying, practice, and Iowa-Iowa State rivalry.

Iowa looks forward to competing in the regional ChemE Jeopardy competition at Iowa State this upcoming April, where they hope to qualify for the 2022 annual national ChemE Jeopardy competition.



*The winning ChemE Jeopardy Team*

## AIChE National Conference Experience— Grace Williamson

The first weekend in November from the 5<sup>th</sup>-8<sup>th</sup> students had the opportunity to attend the American Institute of Chemical Engineering National Conference. This year it was hosted in Boston Massachusetts. On the first day, the keynote speaker touched on the importance of the work of chemical engineers in the development of the Pfizer vaccine for COVID-19. This was especially interesting for me as I hope to continue my education after my undergraduate degree in chemical engineering to work for a pharmaceutical company like Pfizer to make disease treatment and prevention technologies.

Several workshops were hosted over the weekend on topics ranging from graduate school application tips to ways to improve or build your

AIChE chapter. Our chapter hosted one on the peer and professional mentoring program for students in AIChE at Iowa presented by Nina Laskoweicki, Isabella Saccone, and myself. In addition to the workshop, a handful of students also presented individual research that they have worked on throughout the semester in one of the faculty labs on campus. Presenters included Nolan Burson, Marie Ohlinger, and myself.

The jeopardy team came to compete; ready to defend last year's national champion title. The team consisted of Darrel Smith, Mason Lyons, Dimitri Gatzios, and Collin Sindt. Their combined knowledge of biochemical engineering, dimensionless numbers, and national parks allowed them to

## AIChE National Conference Experience (Continued)— Grace Williamson

easily clinch first place again winning by over 10,000 points. I also attended the president's meeting where I met with chapter leaders from all over the nation to discuss things like improving member participation, increasing professional development opportunities and keys to running a successful chapter. Through the hard work of our executive board, advisor Dr. Murhammer, and all our dedicated members our chapter was recognized as an Outstanding Student Chapter for the 17<sup>th</sup> year in a row.

Outside of the conference, we explored local cafes, parks, and boutiques throughout the city. Students returned home with new connections and insights regarding jobs after college or graduate school, a greater understanding of the diverse opportunities in chemical engineering, and memories made with their peers to last a lifetime. After such a great weekend at the national conference, we are all excited to attend the regional conference at Iowa State this spring.



## Undergrad Research-Nolan Burson

I began volunteering as an undergraduate research assistant in Dr. Fiegel's lab at the beginning of my third year. My research aims to improve the delivery of nanoparticle therapies in the lungs. When nanoparticle therapies are traveling through the lungs, they encounter proteins that can bind to their exterior surface. These binding proteins can mask the surface chemistry and prevent the nanoparticles' therapeutic response. The lab is using polymer coatings to reduce the degree of protein binding to the particles.

My project focuses on characterizing the lung proteins adhering to bare nanoparticles and nanoparticles with polymer coatings. I utilize SDS-PAGE, a gel electrophoresis technique, to separate the ad-

hering proteins from the nanoparticles. This technique separates the proteins into bands based on their molecular weight with heavier proteins traveling a shorter distance while lighter proteins travel a longer distance. I compare the experimental protein weights to literature weights in order to identify which proteins adhere to the bare particles versus those binding to the polymer-coated particles. Trials look to determine which proteins favor the bare and polymer-coated particles as well as the relative amount of protein binding.

## Chevron AIChE ScaleUp Sponsors Essay Contest— Anthony Wagner

When I read the Chevron prompt for the 2021 AIChE ScaleUp Sponsors Essay Contest, I knew I had a great opportunity to share about something that I'm passionate about and have been able to experience first-hand. The work being done towards creating a lower-carbon future is continuously growing, and it is an exciting thing to see. The prompt for this essay was "Affordable, reliable, ever-cleaner energy is essential to achieving a more prosperous and sustainable world. For Chevron, reducing the carbon intensity of oil and gas represents a tremendous opportunity to advance the global net zero ambitions of the Paris Agreement and build a lower-carbon economy. How will you contribute solutions to the energy transition challenge as a professional chemical engineer?" As I read this, I immediately thought about the work being done by the company I was currently interning for, Frontline BioEnergy, LLC. Frontline specializes in biomass gasification technologies, and they are doing great work towards creating a cleaner energy future by converting biomass into usable, natural gas along with multiple other valuable products. Being able to see pilot plant operations and the early design phases of a plant that will play a pivotal role in clean energy was a great experience. I'm very grateful to the judges that selected my essay as a winner for this year's contest.

Below is a copy of the essay I wrote for the Chevron-sponsored AIChE ScaleUp Sponsors Essay Contest:

Throughout this summer, I have had the opportunity to intern with Frontline BioEnergy, LLC in Nevada, Iowa. The company is focused on biomass gasification to produce clean, renewable energy. Before this summer, I had never learned much about gasification technologies, but now that I see the ca-

pabilities of it, I believe it could be a huge source of clean energy in the future. Multiple metric tons of biomass can be processed in a day, producing syngas which can be converted into natural gas. The process also produces a byproduct of biochar which has multiple uses but is typically purchased as a fertilizer. Biomass gasification not only produces cleaner fuels, but it helps rid of waste from many different chemical process plants. Any biomass accumulated by a plant must be either burned into the atmosphere or sent to a landfill, but with gasification, the biomass can be put to good use by providing renewable energy for the plant. A plant designed by Frontline is currently being built in Redfield, Iowa which will consist of a similar process, pyrolysis. This process will turn biomass into a bio-oil which has very promising uses in the production of bio asphalt.

I believe that these steps that we are taking now are the next big steps towards building a lower-carbon economy. Being able to utilize renewable sources of energy at industrial levels will lead to alleviating the need for coal, oil, and other fossil fuels. The use of biomass is only a small fraction of what can be done, however. We have already seen the drastic rise of electric transportation in the last few years, and I do not see that slowing down anytime soon. Along with that, increasing and improving the ability to harvest solar and wind energy provides a form of energy that is available every single day in most parts of the world.

As a chemical engineer, I am excited to be able to apply everything I learn towards creating a better world for the future. There is no better group to lead the charge for making a cleaner planet than chemical engineers. We are equipped with the knowledge of the sciences, problem solving skills, and the innovative spirit to find new solutions to today's problems. I plan to continue investing my time

## Chevron AIChE ScaleUp Sponsors Essay Contest (Continued)– Anthony Wagner

in working with these renewable fuel technologies or getting involved with research. I will also continue to educate people on the problems that chemical engineers are tackling and let people know that there are solutions to those problems, but it is going to take more than just a group of engineers to make real changes in our world.

## Kids Day Camp — Nick Brunn, Hannah Camposeo, Madelyn Johnson, Maddie Haase

The University of Iowa's chapter of the American Institute of Chemical Engineers (AIChE) hosts an outreach event once a semester for kids in grades K-5. This event is a science day camp that has a theme of Halloween in the fall and Earth Day theme in the spring. This event includes a variety of science and engineering themed activities for the kids to do.

The most recent day camp was on October 23, the weekend before Halloween. The kids and volunteers were encouraged to wear their costumes as a fun way to incorporate the Halloween theme. Costumes included a construction worker, witch, cowgirl, marine, and many others.

This year, Kids Day Camp was held in the Herky Room at the IMU. We decorated it with Halloween themed table covers and decorations. The first activity that we had everyone do was make marshmallow towers with marshmallows and toothpicks to see who could make the tallest tower. Next, we made different colored lava lamps using water and oil to explain the idea of density to the kids. Then, before a brief snack break, we played Halloween themed bingo and passed out candy as each kid got a bingo.

After the snack break, we took the kids out to Hubbard Park to run around a bit and play duck duck goose. While playing duck duck goose, some of the volunteers stayed inside to begin preparing the elephant toothpaste. Once they were ready, they joined

us outside and mixed the yeast they prepared with some dish soap and hydrogen peroxide. The kids had a ton of fun watching the "toothpaste" foam up and spit out of the pop bottle.

Once back inside, we made some oobleck for the kids to play with and take home with them. This activity turned out to be super messy but also a lot of fun. Luckily, oobleck is made of only 2 ingredients so it was relatively easy to clean up.

Kids Day Camp was a huge success this semester. We had 14 kids participate and are hoping for an even bigger turnout next semester for our Earth Day themed camp.



*Participants making marshmallow towers*

## OXE Liquid Nitrogen Ice Cream— Edgar Salinas

This year Josh Halverson and I had the joy of being the activity coordinators for the Alpha Epsilon chapter of Omega Chi Epsilon (OXE) at The University of Iowa. One of the most renowned events which OXE puts on is the Liquid Nitrogen Ice Cream Sale. Ecstatic to get the opportunity to host this event, Josh and I got to work quickly, putting together a team and perfecting the recipe! On October 15<sup>th</sup>, the day of the homecoming parade, we organized the team and got set up early at 10AM in the Seaman Center to sell some ice cream! I was nervous going into the event because OXE had not had the opportunity to put this event on in two years due to being remote over the 2020-2021 school term. Nevertheless, to my surprise once I got done with my lab and went down to check on the sale there was a lengthy line of people waiting to have their ice cream served, which brought a huge smile to my face as right from the start you could tell the event was on track to be a huge success! For the next eight hours some very happily willing volunteers from OXE helped serve Liquid Nitrogen Ice Cream, bringing smiles to everyone in the Seaman Center. However, the most joyous part was yet to come. This year OXE experimented with a new recipe, a vegan recipe! This vegan recipe was added to provide a more inclusive event to help bring ice cream to those who do not generally get to enjoy it. This was another nerve racker for us as this had never been done before by OXE. Yet, providing this vegan recipe was the proudest moment yet for

OXE; nothing will warm your heart more than giving a kid with a dairy intolerance the chance to enjoy some ice cream! Seeing the smiles of all those kids who typically do not get to enjoy ice cream was the cherry on top and from now on OXE will be sure to always bring the vegan recipe to the Liquid Nitrogen Ice Cream sale to bring smiles to as many people as possible.



*OXE Members making the liquid nitrogen ice cream*

## Co-op with Bayer— Katelyn Murhammer

Throughout the fall semester, I had the opportunity to complete a Process Engineering Co-op at Bayer Crop Science in Muscatine, Iowa. With this being my first experience in industry, I was able to learn more about the daily tasks of an engineer in industry and how the chemical engineering knowledge gained throughout school can be used in reality. I had a wonderful experience working with the other co-ops at Bayer and also being able to form relationships with my manager, other engineers, and the technicians that I worked with. My co-op time was spent with Bayer's aniline herbicide process where acetochlor, alachlor, and butachlor

are made from ethanol, methanol, and butanol, respectively. With COVID-19 still being prevalent, I worked in-person every other day with the opposite days being remote work.

When I started my co-op, I was assigned a variety of projects to work on throughout the six months that I was there under the supervision of my mentor and manager. After the first couple of weeks spent on company trainings, I started working on my projects more in depth. One of my largest projects involved the bypass of switch tanks in our process. These tanks were designed to hold the process material before continuing on to being held in storage,

## Co-op with Bayer (Continued)— Katelyn Murhammer

but they no longer were found to be a valuable part of the process as they required significant maintenance and regulatory costs each year. The goal of this project was to re-pipe the process line around these switch tanks to go directly from the condenser to the storage tanks. With this, I was tasked with completing all of the associated documentation and planning the physical piping for this change. A significant portion of my time was spent editing the detailed process control documents for this part of the process which involved setting a selector switch to choose which storage tank to send the material to and creating controls that replaced those used for the previous tank inlet valve.



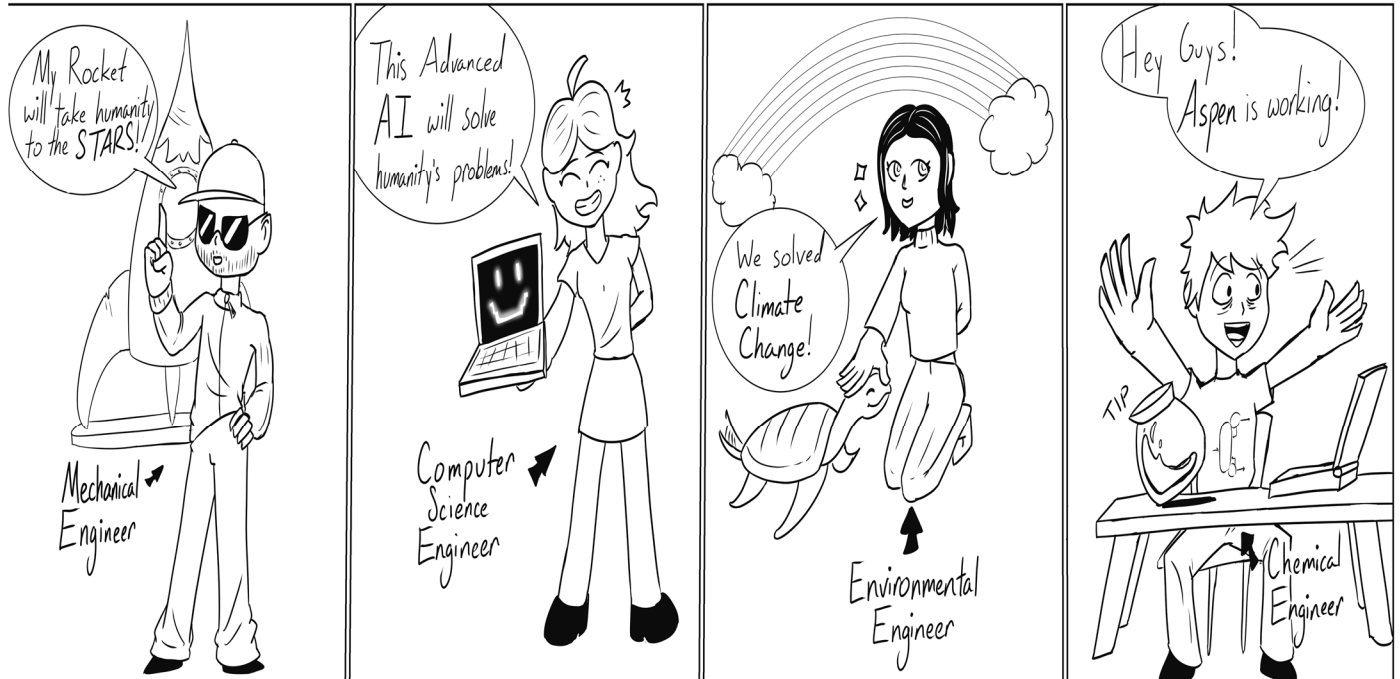
Additionally, I had the opportunity to size a steam injector for a part of our process where pipe hammering was a large issue. With the new steam injector, the introduction of steam would be better controlled and therefore reduce the maintenance costs associated with the pipe hammering problem. In order to size this steam injector, I utilized valve flow coefficient charts, energy balances, and equivalent length calculations to find the flowrates of the steam and water in the system. By finding these parameters, the steam injector was able to be sized and budgeted with help from the product manufacturers. Some other projects that I was involved with include the implementation of dry run detectors for use on the diaphragm pumps in the process that were often left to run dry since they were controlled only in the field, gather process information to size a new process centrifuge, and submit management of change documents to implement the changes I made with my

projects and other relevant process changes. Also, I was able to work on the flow and temperature optimization of process scrubbers using Aspen Plus to minimize the waste in the off-gas and have the greatest scrubbing efficiency.

Other than the time I spent independently working on my projects, I spent time in daily meetings to discuss the process and any safety issues, in optimization and reliability meetings, discussing projects with my mentor and manager, working with the other co-op in my unit, and attending others events put on by Bayer's women in engineering resource group and the engagement group at the site. Overall, the projects I was assigned and meetings I was able to be a part of allowed me to interact with many people throughout the site and utilize some of the technical skills that I have learned in school. I loved having the opportunity to complete a co-op and would definitely recommend it for those who want to learn more about industry and gain relevant experience.





**ChemE Comic — Nick Brunn***Fantasies of Engineers* by Nick Brunn**Follow us on Linked in****Attention Alumni**

There is now an IOWA Chemical Engineering Alumni LinkedIn page for you to join!

Its called [AICHE at the University of Iowa.](#)

Check it out for more frequent IOWA ChemE news, we would love to see you there!



## Acknowledgements

Thank you to the AIChE Officers for their hard work and contributing efforts to make our AIChE Student Chapter a successful organization.

### Fall 2021 Officers:



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poseo, Madelyn Johnson, and Maddie Haase

**Volunteer Chair:** Nolan Burson

**Advisor:** Professor David Murhammer

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**Faculty Advisor:** Professor David Murhammer

**Contributors:** Nolan Burson, Grace Williamson, Darrell Smith, Edgar Salinas, Katelyn Murhammer, Anthony Wagner, Nick Brunn, Hannah Camposeo, Madelyn Johnson, and Maddie Haase

*Your help is much appreciated!*

Interested in speaking at professional seminar? If so, then contact our Spring 2022 AIChE Student Chapter Vice President Nick Brunn at [nicholas-brunn@uiowa.edu](mailto:nicholas-brunn@uiowa.edu) or Student Chapter Advisor Prof. David Murhammer at [david-murhammer@uiowa.edu](mailto:david-murhammer@uiowa.edu) for details and availability!