

NEW MEXICO TECH

SCIENCE • ENGINEERING • RESEARCH UNIVERSITY

Chemical Engineering

2023 Spring Newsletter 2023

Important Dates

- Student Research Symposium
2023 - April 18th - 21st
- ChemE Junior and Senior Design Presentation and AIChE Banquet -
April 28th
- Commencement - May 13th -
9:00AM - 1:30PM

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Message from Our Chair



Dear Techies and Friends,

I hope you enjoy the collection of events that we have highlighted in our Spring 2023 NMT Chemical Engineering newsletter. It has been another great year in our department, with both our undergraduate and graduate students distinguishing themselves on campus and at professional society meetings. We proudly watched 22 seniors graduate in May and welcomed new graduate students in August for a total of 17 graduate students.

In the Fall semester, NMT had an Accreditation Board for Engineering (ABET) visit. I thank the chemical engineering faculty for their diligence in annual assessments and our Industrial Advisory Board for providing valuable feedback on our program so that we may continually improve.

We sent warm wishes with Dr. Donglee Shin as he joined his wife in the pharmaceutical industry in Michigan. Our students, faculty, and staff surprised him with cake and fond words (see page 10) during the time he reserved in CHE 352 Separation Processes for the end of the semester "teaching evaluation". We miss him, his cololads and bioprocessing expertise, and his warm and cheerful engagement with all of us.

A great big "Thank You" goes out to the Jason Harper and the New Mexico Legislature for their support of our program in the last few years. We received funds for both research and teaching equipment and student fellowship support. This has allowed our department to flourish. Our graduate program starting in January of 2021 with 1 MS student now has 12 MS students and 5 PhD students, the number of research proposals submitted and funded grants has doubled! Our Unit Operations and Process Laboratories in Jones Hall used new lab equipment for the first time in the Fall of 2022 and Spring of 2023 (see pages 6-7).

Finally, we welcome anyone that wishes to watch our junior and senior design presentations at our annual Design Day on April 28th in Jones Hall 227 from 10:15AM - 2:30PM. -MissBeBe

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2022 Graduation



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ChemE STUDENT AWARDS 2022



Outstanding Student Award

Catherine House

Student Service Award

*Taylor Le
Alex Logan
Brandon McReynolds*

True Grit Award

Alex Logan

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NMT AICHE Student Chapter

President's Message



The NMT student chapter of the American Institute of Chemical Engineers (AICHE) provides several opportunities to its members. Club participation in volunteering opportunities is on the rise, as we hosted several events in 2022 with a great turnout. Some examples are the NMT President's Golf Tournament, Career Fair, Local Trash Pickup, and helping other clubs when needed. In addition to service events, the chapter also hosted social events for its members. Along with regular meetings to relax and compete in ChE trivia, the chapter hosted a few movie nights.

Students who represented AICHE at these events showed exceptional dedication to self-improvement and service to their community. While the NMT chapter actively participated in several events, the biggest event of all was the AICHE Annual Student Conference (ASC). This event took place in Phoenix, AZ and 17 NMT chemical engineering undergraduates took part in this great experience. Several students presented posters on their research, attended professional development talks, and competed in ChE Jeopardy. ASC featured the NMT Student Chapter of AICHE on their website; outlining our trials and how we overcame all the obstacles associated with traveling to this event.

Up next, the chapter plans to continue volunteering and hosting events to better support one other. A new semester brings fresh, new ideas and we are very excited. The chapter plans to continue our regular meetings in addition to movie nights, karaoke nights, a bake sale and several opportunities through NMT. The AICHE Rocky Mountain Regional conference will be held in April, in Laramie, WY. We are hoping to take as many students as possible, as we will be competing to qualify in both Jeopardy and ChE car events. The actual number will depend heavily on funding, but we hope to take at least 10 students to experience an AICHE conference. - Samantha Lindholm NMT AICHE Student Chapter President 2022-2023

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Fluid Friction Laboratory:

The general goal of this laboratory is to study head losses due to frictional effects in fluid flows through pipes. These head losses are a function of various geometric and flow parameters including pipe diameter, length, internal surface roughness and type of fitting. In this experiment, the influence of some of these parameters on head losses in pipe flows will be evaluated by performing the following lab exercises:

Exercise A - Fluid Friction in a Smooth Bore Pipe: Evaluate the relationship between head loss due to fluid friction and velocity for flow of water through smooth bore pipes and to confirm the head loss predicted by a pipe friction equation.

Exercise B - Head Loss Due to Pipe Fittings: Evaluate the head loss associated with flow of water through standard fittings used in plumbing installations.

Exercise C - Fluid Friction in a Roughened Pipe: To determine the relationship between fluid friction coefficient and Reynolds' number for flow of water through a pipe having a roughened bore.

Exercise D - Flow Measurement Using Differential Head: Demonstrate the application of differential head devices in the measurement of flow rate and velocity of water in a pipe.



Process Control Laboratory:

The goal of this lab is to provide experience in applying the principles of process dynamics and control to real-world systems, that allow students to study the behavior of dynamic systems, model their behavior, and design control strategies to regulate their behavior. We recently upgraded our Process Dynamics and Control lab by adding two brand new pieces of equipment; Level controlled tank and Flow controlled tank. This equipment provides a clear demonstration of different controller actions (Closed loop, Proportional control, Proportional-Integral, PI and Proportional-Integral-Derivative, PID).



Figure: Flow controlled tank and Level controlled tank



New Mexico Tech Day at the Roundhouse



From Left: Diana Alvarado, Samantha Lindholm, Arianna Matthews, and Dr. Youngmin Lee

Events

New Mexico Tech Outreach 2022



Chemical Engineering's Seth Price giving demonstrations for high school students

2022 AIChE Banquet



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2022 ChemE Car



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Chem-E Freshmen Chem Car Competition



Team I'M JON:

Ian Simpson, Milton Perkins, Jesus Barajas, Olivia Maass, Ngoc Bui



Team DEET:

David Harkey, Elliot Clawson, Erica Pape, Taleyah Beyer



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Chem-E Freshmen Chem Car Presentations



Team Third Time's a Charm:

Grayson Shaw, Drake Morehead, Jeremy Barber, Efrain Pita



Team Vinegaroons:

Jackson Orr, Joseph Bell, Josiah Martinez, Peter Wilson



Scholarships



Our 2022 Permian Basin Gas Processors
Scholarship winners:
Gaeun Kim and James Angelos

Competition Awards



Catherine House was 2022's recipient of the Cramer Award



2022 AIChE Student Conference:

Arrika Duran (3rd from left), Placed 3rd in the Poster Competition



2022 Rio Grande Symposium for Advanced Materials:

Atiqur Rahman took 1st Place in the Oral Presentation Competition



2023 NMT Engineering Student Awards

Samantha Lindholm (3rd from left) was voted 2023's Engineering Student of the Year

Department Happenings




Halloween
2022



2022 49ers Chemical Engineering Open House



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Department Happenings



Christmas 2022



Farewell Dr. Shin!



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**LEGISLATIVE SUPPORTED 2022-2023
GRADUATING MASTER'S STUDENTS****Atiqur Rahman**

Degree - Master's Chemical Engineering

Advis or - Pabitra Choudhury

Biography - Atiqur successfully defended his thesis; "*Phase-Field Simulation of Solidification of Aluminum Alloys*" in August of 2022. He has accepted a position with Trinity Consultants as an Associate Consultant in Albuquerque, NM and is a recent newlywed! Congratulations Atiqur!

**Chase Ferrone**

Degree - Master's Chemical Engineering

Advis or - Pabitra Choudhury

Biography - Chase successfully defended his thesis; "*Ab Initio Study of Organometallic Phthalocyanine Catalysts for the Conversion of Methane to Methanol*" in August of 2022. He has accepted a position with Intel as a Packaging Research and Development Engineer in Chandler, AZ.

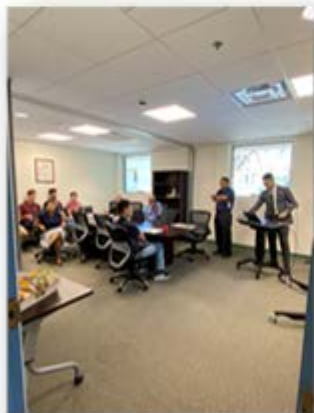


**LEGISLATIVE SUPPORTED 2022-2023
GRADUATING MASTER'S STUDENTS****Kavon Mojtabai**

Degree - Master's Chemical Engineering

Advisor - Sanchari Chowdhury

Biography - Kavon successfully defended his thesis; "*Refractory Plasmonic Nanoparticles for Visible Light Mediated Recycling of Epoxy*" in November of 2022. Kavon has accepted a position with Gopher Resources in Minnesota as a Process Engineer.

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**LEGISLATIVE SUPPORTED
Graduate Students****Amrutdyuti Swamy**

Degree Sought - Ph.D.

Advisor - Pabitra Choudhury

Current Research - *"My current research focus is on computational simulation of materials using tools like molecular dynamics and phase field simulations. I am currently working to compute solid-melt interfacial energies of Al alloys at different compositions, temperatures, and thermal gradients. These atomistic simulations help in predicting the microstructure in metal additive manufacturing processes.*

This is a very important area of research, as it has the potential to improve the quality and efficiency of metal additive manufacturing processes. By understanding the solid-melt interfacial energies, one can design materials that are more resistant to cracking and melting, and produce more consistent results. This will allow for the production of higher-quality parts, which can be utilized in a variety of applications.

This work is also important because it is helping to advance the field of computational materials science. By using atomistic simulations to study the solid-melt interfacial energies, we are able to gain a better understanding of the underlying physics and chemistry of these materials. This knowledge can then be used to develop new materials and processes, which can benefit a wide range of industries."

Bio - Amrut earned his BS in Petroleum Engineering from the University of Petroleum and Energy Studies (UPES) in Dehradun, Uttarakhand, India. He then came to NMT to pursue his MS in Petroleum Engineering. After Amrut obtained his MS, he worked as a field engineer for 2 years where he analyzed drill cut samples for organic content and identifying oil-bearing zones. After graduation, Amrut wishes to continue working in this research domain of computational material science. He would like to work for larger national labs who specialize in fundamental research on new materials.



**LEGISLATIVE SUPPORTED
Graduate Students****Hirithya Sharad Jeyashangararaj****Degree Sought - Ph.D.****Advisor - Sanchari Chowdhury**

Current Research - *"My research focuses on synthesizing photoactive transition metal catalysts which can utilize sunlight to drive energy extensive reactions. We are developing a green industry friendly synthesis method to deposit catalysts such as Ni and Pt on metallic supports by employing visible light. More importantly, we can tune the light wavelengths and intensity to control the size of the catalysts from nanocluster to a single atom."*

Bio - Sharad is from a city in India called Madurai. He earned his bachelor's degree in Chemical and Electrochemical Engineering, from one of India's most reputed Research laboratories, called CSIR – (Central Electro-Chemical Research Institute) in Karaikudj, India. Sharad published a paper on "*Electrospun Fe-Incorporated ZIF-67 Nanofibers for effective Electro-catalytic Water splitting*", during this time in Dr. Subrata Kundu's Electro-catalysis Lab. Sharad has been pursuing his Ph.D. with Dr. Sanchari Chowdhury at NMT since Fall 2022 and after his graduation he would like to choose a career in the field of research.

LEGISLATIVE SUPPORTED Graduate Students

Tahmidul Islam

Degree Sought - PhD

Advisor - Dr Pabitra Choudhury

Current research-

Hydrogen fuel cells are a promising prospect in the quest for an alternative green energy source. However, one of the main obstacles to the widespread adoption of hydrogen fuel cells is the high cost of the conventional catalyst (platinum) used to facilitate the cell reaction in order to produce electricity. Also, platinum suffers from sluggish reaction kinetics and stability in the cathode of the fuel cell. Hence, Tahmid is currently trying to develop an inexpensive catalyst that will not only be affordable but will also possess enhanced stability and perform better than the conventional hydrogen fuel cell electrocatalysts. His broader research work is focused on the development of sustainable and efficient catalysts which can drive significant progress in the transition to a more sustainable energy future.



Bio -

Tahmid completed his BSc in Chemical Engineering from Bangladesh University of Engineering and Technology (BUET) in 2019. After graduation, he worked for three years in a PVC resin manufacturing facility and heavy crude oil refinery before getting enrolled in the PhD in Chemical Engineering program at New Mexico Tech in Fall 2022. He seeks to pursue a career in the alternative energy sector upon his PhD graduation. He loves to work out, play soccer, travel and cook during his leisure time.

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**LEGISLATIVE SUPPORTED
Graduate Students****James Ruff****Degree Sought - Ph.D.****Advisor - Pabitra Choudhury****Current Research -**

"I am working on internal chemistry of mesopores in high explosives, with a focus on HMX. This research is meant to shore up areas of misunderstanding in previous work through the application of Bayesian inference taking into account phase transitions and the subsequent catalytic surfaces that form. My overarching goal is to mitigate as much risk in manufacturing and handling these materials as possible."

Bio - James earned his BS in both Chemical Engineering and Chemistry (NMT) and is now pursuing a Ph.D. while working for Los Alamos National Labs.



LEGISLATIVE SUPPORTED Graduate Students

Janet Baffoe

Degree Sought - Master's

Advisor - Corey Leclerc, Ph.D.

Current Research - Janet is currently undertaking her research on catalysis for hydrogen production. Her goal is to enhance the stability and conversion efficiency of the Ni-based catalyst used in the dry reforming of methane to generate hydrogen gas. She has always been interested in sustainable processes as it contribute to minimizing the emission of greenhouse gases. She is confident that her project's outcomes will significantly lower the creation of coke in dry reforming processes, improve hydrogen production for electricity, and increase power generation for household and industrial usage.

Biography - Janet is originally from Ghana, West Africa. She earned her Bachelor of Science degree in Chemical Engineering at the Kwame Nkrumah University of Science and Technology (KNUST) in Kumasi, Ghana.



Xuan Pham

Degree Sought - Master's

Advisor - Corey Leclerc, Ph.D.

Current Research - Xuan's research focuses on investigating the effect of different support materials on the dry reforming of methane to hydrogen and carbon oxides using a nickel catalyst. Dry Reforming converts two greenhouse gases, carbon dioxide and methane, to synthesis gas, an important material for many chemical processes. Xuan expects catalysts with high activity and coke-resistance ability by using supports with high oxygen storage capacity.

Biography - Before coming to NMT, Xuan earned her Bachelor's degree in Chemical Engineering at the Petrovietnam University in Vietnam.



**LEGISLATIVE SUPPORTED
Graduate Students****Aaron Plant**

Degree Sought - Master's

Advisor - Younghmin Lee

Current Research - Aaron is studying the effects of adding a second block to a conjugated polymer. Conjugated polymers are typically brittle or flexible, but these properties can be combined creating a conjugated block copolymer. Aaron is studying the solubility properties of these polymers to use for printing and micellar applications.

Biography - Aaron attended St. Pius High School in Albuquerque, NM before coming to NMT to get his BS and now on to earning his Masters in Chemical Engineering.

Announcements



Join us for our Spring 2023

Junior and Senior Design Presentations

Jones - 2nd Floor - Room 227

- Junior (2) and Senior Design Presentations (2) 10:00AM - 11:45AM

- Lunch (provided) 11:45 - 1:15PM

- Senior Design Presentations (3) 1:15PM - 3:00PM

Followed by:

Chemical Engineering's Annual AIChE Banquet

(\$25.00-\$35.00 per person)

5:30PM—7:30PM

Bodega Burger Company

Friday - April 28th

A special **thank you** goes out to **Peter J. Valdez** for generously donating \$400 and **Rachel Golden and Intel** for a donation of \$200 to our Student AIChE Club this year! This will help them with their upcoming trip to Wyoming for the AIChE 2023 Rocky Mountain Student Regional Conference!

Want some ChemE swag? *



For a donation of \$35.00 - we will send you a ChemE pint glass and lanyard or a ChemE t-shirt and lanyard!

Donate \$45.00 +shipping you have your choice of a long sleeve tee and lanyard or a polo!

And for a donation of \$55.00 - you can get a ChemE hoodie!



<https://advancement.nmt.edu/ChemEng-donate>

* All donations benefit ChemE Car, ChemE events, and department student awards. Under the Additional Information (Optional) heading, in the comments box please specify your preferred apparel choice, size (S, M, L, XL, XXL) and where you would like your items sent.

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