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CHEMICAL AND BIOLOGICAL ENGINEERING

Spring 2025

A Newsletter for Friends and Supporters of the Mines CBE Department

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Alumni! We'd love to hear from you, send us an email or connect with us on LinkedIn and let us know what you're up to.

On the cover: Mines Chemical Engineering Students tour Suncor - photo provided by Basil Nakhleh

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SPRING 2025
A newsletter for friends & supporters
of the Colorado School of Mines Department of
Chemical and Biological Engineering

Newsletter created by Laura Ragsdale, Program Assistant

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FROM THE DEPARTMENT HEAD

Springtime in CBE

Dear friends and supporters of Mines Chemical and Biological Engineering,

Spring 2025 has been a season of celebration, innovation, and continued excellence for the CBE Department. I'm thrilled to share this newsletter with you, showcasing just a few of the many accomplishments of our outstanding faculty, students, and alumni.

This issue highlights a range of honors and recognitions—including major awards from the National Science Foundation (NSF), National Institutes of Health (NIH) , the American Association of the Advancement of Science (AAAS) and the American Institute for Medical and Biological Engineering (AIMBE)—reflecting the strength and impact of our research community. You'll read about our vibrant undergraduate research programs, graduate student achievements, and exciting faculty promotions. We are especially proud to celebrate our Spring 2025 undergraduate award winners, who continue to impress with their talent, curiosity, and drive.

Our department is also growing in new and meaningful ways. With faculty pushing the boundaries in neuroscience education, gene therapeutics, soft robotics, and energy materials, CBE at Mines is playing a leading role in shaping the future of engineering. We are also committed to providing a supportive and inclusive environment for all members of our community and continually strive to make CBE a great place to learn, teach, and discover.

Whether you're a longtime supporter, an alum, or a new friend of the department, we hope this update gives you a sense of the energy and ambition that define CBE at Mines. Thank you for being part of our journey.

Warm Regards,
Dr. Nanette Boyle
Department Head, Chemical and Biological Engineering

Department Head

Nanette Boyle named Department Head for Chemical and Biological Engineering

This article was written by Jasmine Leonas and originally appeared in the Mines Newsroom

Nanette Boyle has been named department head for Chemical and Biological Engineering at Colorado School of Mines.

A member of the Mines faculty since 2013, Boyle is an associate professor. She has served as interim chair of the department since August 2023 and her permanent appointment began in December 2024.

"I'm excited to lead the department in new directions," Boyle said. "Chemical engineers are going to be important in the energy transition because a lot of our traditional strengths lie in systems optimization. With all the new technologies being developed, we're going to need chemical engineers to design and optimize these new processes. We are looking to innovate the curriculum to ready our students to meet the needs of future industries."

Undergraduate students in the Department of Chemical and Biological Engineering follow a curriculum that builds upon fundamentals of biology, chemistry, mathematics and physics.

As department head, Boyle has three major goals for the department: to be recognized as a leader in innovative chemical engineering pedagogy, to increase visibility of the strength of the department's research and graduate programs and to improve the overall well-being of the department's students, faculty and staff, making it a great place to work and study.

"The department needs more brand recognition and visibility," Boyle said. "We're leaders in research and should be recognized more for the work we're doing in a variety of industries. We want to let people know all the things that chemical engineers can do."

Boyle holds a PhD from Purdue University and a Bachelor's degree from Arizona State University. Her research group focuses on using genome engineering approaches to design photosynthetic organisms capable of producing fuels, feedstocks and fine chemicals in a sustainable way.

Faculty Awards and Honors

Melissa Krebs was inducted into the American Institute for Medical and Biological Engineering College of Fellows.

AIMBE fellows represent the top 2% of medical and biological engineers and they include the most accomplished medical and biological engineers. Her nomination was for 'pioneering advancements in cell-interactive biomaterials and clinical translation specifically in regenerative medicine and drug delivery technologies.' Congratulations Melissa!

Dave Marr was recently awarded an R01 from NIBIB entitled "Aerosolized microbots as a platform for targeted lung therapy". Congratulations Dave!

Dave Marr, Yan Gao, and Ning Wu had a paper published in nature physics. In it, we determined a method for reversibly creating colloidal quasicrystals, a unique state of matter whose discovery led to the nobel prize in chemistry back in 2011. View the article at this link: https://rdcu.be/efM9z

Carolyn Koh, Professor in Chemical and Biological Engineering, named as a Fellow of the American Association of the Advancement of Science (AAAS).

Koh was recognized for her "contributions to advancing the discipline of chemical engineering by pioneering the interfacial controls for gas hydrate crystallization in energy storage and pipeline plugging mitigation."

Prof. Ramya Kumar was recently awarded the NIH R21 Trailblazer Award. From the National Institute of Biomedical Imaging and Bioengineering (NIBIB).

This is a very prestigious early career award for New and Early Stage Investigators to pursue research programs of high interest to the NIBIB at the interface of the life sciences with engineering and the physical sciences

NEUROSCIENCE IN CHEMICAL AND BIOLOGICAL ENGINEERING

written by Dendy Sloan March 2025

In 2024 when beloved Professor Cynthia Norrgran (MD, PhD) retired to her Montana ranch, she was presented with the Board of Trustees Award, their highest accolade.For two decades Cynthia guided pre-medical students at Mines, and valiantly taught six classes per semester, when the normal teaching load was two classes per semester.In addition, she daily drove 45 miles each way from her home in Parker, Colorado to Mines, frequently in inclement winter weather.

Cynthia received her undergraduate degree in Physics from University of Minnesota in 1971 before pursuing extensive medical and doctoral training, culminating in 2004 with 15 years of neurosurgery in Englewood. Using the pen-name of Sylvia Norton,Cynthia wrote "Blood on the Mask," a book of 25, five-page (average) vignettes of a neurosurgeon's life.

In 2011 when Cynthia began professing at Mines, she was welcomed by many students who wished to enter the medical profession.

In Plato's Cave, viewers saw images in two dimensions, not three, until they came from the cave into the light

She quickly found herself advisor to many individuals and pre-medical organizations, as well as a beloved professor in all neuroscience and biological courses.

Over the two decades Cynthia professed at Mines, she was an assiduous, caring professor, frequently teaching as more than 300 students per semester.She was also very altruistic, sometimes funding students with her personal funds, such as the summer internship of a student with David Redish, notable University of Minnesota neuroscience professor.

Cynthia was funded by the Colorado Department of Higher Education to develop 111 YouTube videos on Neuroscience, which are currently the basis for Artificial Intelligence (HiTA) in CBEN 311 "Introduction to Neuroscience." HiTA is a student tutorial program which was accessed over 1,000 times by students during the 2024 fall semester

Students loved Cynthia for her many, diverse hobbies, such as piano, falconry, extraterrestrial theories, and Star Wars models.Mines will not see her like again.

Fernando Giráldez (MD, PhD) has been teaching neuroscience at Mines for five years with Dendy Sloan, specializing in CBEN 411/511 "Neuroscience, Memory, and Learning," and CBEN 498/598 "Brain, Mind, and Arts."Fernando is Emeritus Professor at the Universitat Pompeu Fabra (UPF), Barcelona. With an extended academic career, his research focused on the development and function of sensory organs. He published more than one hundred scientific articles in international journals and books, being guest speaker at universities, research institutes and scientific meetings around the world.

The allegory of the cave today

Expert and panel member of research agencies and scientific journals, and member of scientific societies, Fernando does not run a lab anymore but is actively involved in scientific writing and teaching. He has developed novel neuroscience courses linking brain sciences and the humanities. With a broad experience in graduate and post-graduate education, he has been involved in curricular design and held several academic decision-making positions like Vice-Rector for Research and Department Head at two universities in Spain.

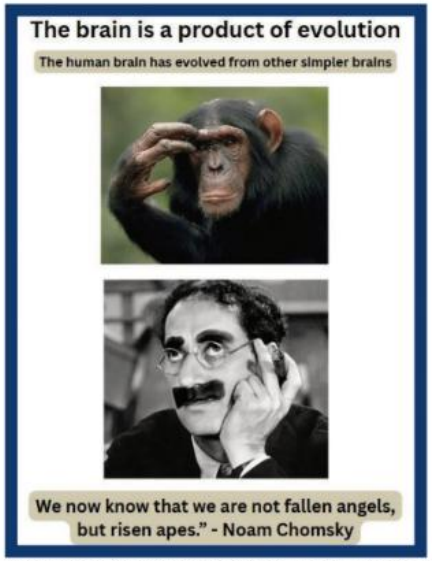
On September 10, 2024, Fernando was invited to give a seminar to the neuroscience department at the University of Colorado, Boulder, regarding his new book on science and art in the Prado Museum. The Mines CBEN department is extremely fortunate to have this neuroscience intellectual with us each fall from Spain.

In 2009, when University Distinguished Professor Carolyn Koh became head of the Center for Hydrate Research, Dendy Sloan took the bus to CU Boulder, just as the CU Psychology Department was morphing into Neuroscience, a harder science with a narrower distribution function.The CU faculty encouraged Dendy to audit all their graduate neuroscience classes over the next six years. Upon returning to Mines, Dendy was the principal author of two textbooks with Cynthia Norrgran – "Neuroscience, Memory, and Learning" (2016; 2018, 2nd edition).

In 2016 Dendy and Cynthia published an invited article in the 50th anniversary issue of *Chemical Engineering Education* entitled "A Neuroscience Perspective on Learning."

Dendy is currently Mines University Professor Emeritus, teaching each fall semester with Fernando Giráldez CBEN 311 "Introduction to Neuroscience," and CBEN 411/511 "Neuroscience, Memory, and Learning,"

During the 2022 summer, Mines was host to the AIChE/ASEE National Summer School, held every five years for Chemical Engineering Faculty from across the U.S.A.At that conference of 160, Cynthia along with neuroscientists Fernando Giráldez (MD, PhD) and Dendy Sloan held a successful workshop for 37 faculty entitled "The Applied Neuroscience of How We Learn."



https://www.newscientist.com/article/mg21128311-800-a-brief-history-of-the-brain/





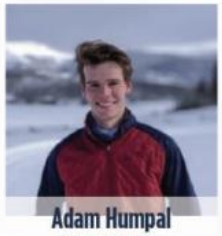
HAPPENINGS IN THE CBE DEPARTMENT

GRADUATE STUDENT AWARDEES

Lauren Cisneros

Graduate Student
Chemical Engineering

"I have without a doubt learned a lot of through undergraduate research, but [Lauren's mentorship] has caused me to develop personally and professionally the most. There have been multiple times where my research has progressed greatly due to her feedback. She is extremely dedicated to making sure that I am successful within the lab."



Adam Humpal

Graduate Student
Materials Science

"Adam has profoundly shaped my perception of research, self-confidence, and curiosity by fostering an encouraging and supportive environment. His ability to break down any complex idea into digestible yet thorough explanations, along with his genuine love for what he does, makes learning not only effective but exciting and memorable."

Adrian Mendonsa

Graduate Student
Chemical and Biological Engineering

"Adrian's mentorship has had a profound impact on my personal, academic, and professional growth. He has made the lab a place where I feel supported, valued, and excited to learn. His dedication to my learning has not only helped me succeed in the lab but has also given me the confidence and desire to pursue research in my career. I am incredibly grateful for his mentorship."

CONGRATS TO THESE AMAZING MENTORS ON THEIR RECOGNITION!

Undergrad Research

FIRST program gives first-year students direct research experience

Undergraduate research fellowship program funds lab work, pairs participants with faculty mentors

FIRST – short for First-Year Innovation and Research Scholar Training – is a selective fellowship program for highly motivated first-year students at Mines to participate in research with a focus on innovation over the course of an academic year. FIRST students are introduced to academic research, connected with a faculty or graduate student mentor and take part in hands-on work in research labs on campus. At the conclusion of the paid fellowship, FIRST students present their work at the Undergraduate Research Symposium, which takes place twice a year.

For Marco Salgado, FIRST was a way to expand his experience in the sciences, something he didn't have access to in high school. Through FIRST, he connected with Andy Herring, professor of chemical and biological engineering and vice provost of strategic initiatives, who introduced Salgado to the field of electrochemistry.

"FIRST really is the reason that I was able to figure out, hey, this is what I want to do," said Salgado, who is now majoring in chemical engineering and in his junior year at Mines. "I had no idea what electrochemistry was when I started, but I just thought it sounded cool. I figured I'd give it a shot, and now, three years later, this is the thing that I love and it's what I want to do with my career."

For Caitlyn Castellion, whose parents are both researchers, going into the sciences and conducting research was always in her future.

FIRST seemed like the perfect way to jump start her time at Mines. Castellion's interest in gene therapeutics led her to Ramya Kumar, assistant professor of chemical and biological engineering.

This article was written by Jasmine Leonas and orialnally appeared in the Mines Newsroom. It has been edited for space.

Student Caitlyn Castellion and Professor Ramya Kumar

"The drugs of the future will be DNA-based drugs, so you need a completely different tool kit in order to make those kinds of drugs, and that's where engineers are solely needed," Kumar said. "There are a mix of skills that go into this research project. It's a very exciting training opportunity for my students who are working on it, because they'll be exposed to all aspects of this research, and Caitlyn is a good example – I'm sure she'll be ready to pursue a PhD somewhere."

For the project, Castellion has been working on developing substrates for cell cultures to grow stem cells. Working with Kumar exposed Castellion to how chemistry, which she is majoring in, is a vital part of gene therapeutics, and how STEM disciplines can overlap and work together. Being part of FIRST also helped Castellion master her time management skills.

Both Salgado and Castellion said they hope to work toward earning a PhD, continuing to do research in the fields they've grown to love while also teaching the next generation of scientists.

"I'd definitely like to do what Dr. Kumar does right now," Castellion said. "She teaches and she has a research lab. That's my ultimate goal."

Ramya Kumar wins NSF CAREER Award

This article was written by Jasmine Leonas and originally appeared in the Mines Newsroom.

Ramya Kumar, assistant professor of chemical and biological engineering at Colorado School of Mines, has received a National Science Foundation CAREER Award for her work to develop polymeric biomaterials that could make genetic therapies cheaper and more accessible.

Genome editors treat people with rare inherited genetic disorders (like sickle cell anemia) or more prevalent diseases with an underlying genetic basis (like cancer) by providing new DNA to specific cells or by changing their DNA. Currently, viral vectors–viruses modified to no longer be infectious—deliver genome editors into cells, but their high manufacturing costs can make these therapies unattainable for many. Synthetic materials like polymers, though, have shown promise and could help lower the cost.

"We understand the genetic basis of disease more thoroughly than we have in the past – and every day we hear about newer more powerful genome editing platforms. But methods for delivering these powerful genome editors into cells remain underdeveloped." Kumar said. "We have made a lot of progress in synthetic polymer chemistry, particularly experimental and computational methods to design and test polymers faster. It's the perfect time to put this all together and solve the delivery challenge for genetic therapies."

The $803,495 award from NSF covers five years of research, during which time Kumar and her team will apply machine learning and advanced polymer science methods to understand why some polymers work well in delivering genome editor proteins to cells while others do not.

Undergraduate Student Awards

Our Spring 2024 Outstanding Graduating Senior is:

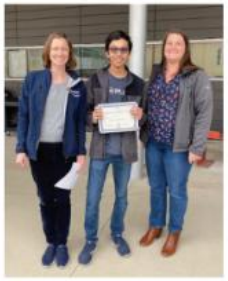
Basil Nakhleh

Harrison Hays Award:

Grace Doud

Pearson Potential Award:

Madilyn "Gracie" Holm



Harrison Hays Award:

Omar Mansurov

Selim Award:

Kagan Killough

Selim Award:

Emma Khorunzhy

E-Days Engineer Award:

Kristina Domashevich

Congrats! Student Awards

Wakana Kani was selected as an NSF graduate research fellow.

Wakana's PhD student mentor, Adam Humpal, had outstanding mentorship of Wakana over the past 2 years and helped her craft a compelling NSF GRFP application.

Wakana is currently deciding between chem E PhD programs among Berkeley, Northwestern, U Penn, UCSD, Northwestern, UW Seattle, Michigan, and Minnesota.

Emma Khorunzy, an undergraduate researcher in the Boyle lab, was named as an honorable mention in the NSF Graduate Research Fellowship. Emma will be attending Caltech in the Fall for her Ph.D.

Two CBE Alum, **Kevin Dunn** and **Eve Wolvington** were among other honorable mentions for this award.

Congratulations to the CBE Winners at the Spring 2025 Undergraduate Research Symposium!

Oral Presentation Winners:

#1| John Braford, Junior, CBE| Mentor(s): Colin Wolden |*Synthesis and Characterization of Nickel-Based Catalyst for Low Temperature Ammonia Decomposition*

Poster PresentationWinners:

#1|Gautier Moreau, Junior, CBE| Mentor(s): Ram Prasad Sekar, Ramya Kumar |*Investigation of Cationic Polymer Microarchitecture for Effective CRIPSR/Cas9 Ribonucleoprotein Delivery*

Congrats to our most recent Ph.D grads!

Tyler Sodia - Cash Lab
Sam Saccomano - Cash Lab
Manasi Vyas - Kwon Lab
Michelle Nolen - Kwon Lab
Saeed Ahmadi Vaselabadi - Wolden Lab
Jessie Troxler - Samaniuk Lab
Xingrui Zhu - Wu Lab

Congrats!

Congratulations to these Goldwater Scholars!

Caitlyn Castellion of Ramya Kumar's lab - Caitlyn is pursuing a PhD in Chemistry with a focus in Biomaterials. She plans to conduct research on genetic therapeutics and teach at a research university.

Marco Salgado of Andy Herring's lab - Marco is pursing a PhD in Electrochemistry. He plans to conduct research on electrochemical devices such as fuel cells and teach chemical engineering at the university level.

Chelsea Johansen awarded the Koerner Family Fellowship Award

Chelsea is a PhD candidate in Nikki Farnsworth's lab and the President of our Chemical Engineering Graduate Association (CEGA). She was awarded for her work titled The peri-islet extracellular matrix in islet function and the pathogenesis of type 1 diabetes.

KFF offers fellowships to outstanding PhD candidates at select U.S. universities to assist them in completing their degrees and related publications.

Rocky Mountain Catalysis Society Symposium in Boulder

- Graduate student **Emily Volk** took first prize in Best Oral Presentation.
- Graduate student **Sean Matthews** took home third prize in Best Oral Presentation.

Congratulations!

GRADS Symposium Awards

Congratulations to these students in CBE who won recognition during the GRADS Symposium in April!

GRADS stands for the "Graduate Research and Discovery Symposium" hosted by Mines every Spring.

- Bio, Health and Social Sciences - **Alyson Camacho** won best PhD Poster
- Computation and Theory - **Robert Ragan** won best Professional MastersNT & Certificate Oral Presentation
- Energy - **Sean Matthews** won best Masters Thesis Oral Presentation
- Materials Science - **Adam Humpal** won best PhD Oral Presentation

Alyson Camacho

Robert Ragan

Sean Mathews

Adam Humpal

High Structure Course Design by Justin Shaffer

Check out Professor Shaffer's new book, *High Structure Course Design: An Evidence-Based Guide to Designing, Implementing, and Assessing STEM Courses*. It be released from Macmillan Learning, with the softcover book for $34.99 and the eBook for $17.99. !

Learn more about the book at this link > https://lnkd.in/gkV7wUd2

PROMOTIONS:

Ning Wu was promoted to Professor

Josh Ramey was promoted to Teaching Professor

AWARDS:

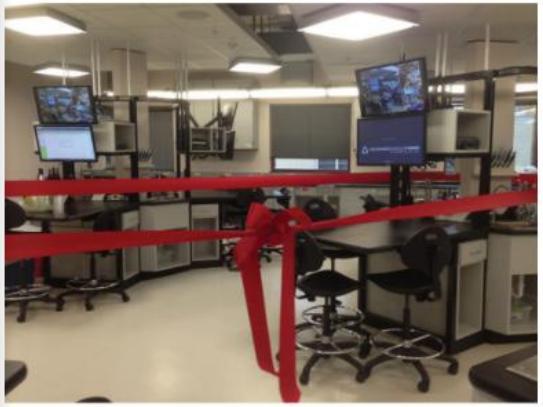
Micha Barankin was awarded the Alfred E. Jenni Faculty Fellowship

Justin Shaffer and Suzy Beeler were chosen by students as Outstanding Faculty in CBE and QBE

Blast from the past

A Chem E computer lab

The installation of our lobby stained glass mural in 1997



The opening of our Studio Bio Lab AH 291

Dr. Wolden and Dr. Marr just palling around

HAVE ANY COOL PHOTOS OF YOUR TIME AT MINES? SEND THEM TO CBE@MINES.EDU FOR OUR ARCHIVES!

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Support Chemical and Biological Engineering

A gift to the Colorado School of Mines Chemical and Biological Engineering Department helps our students succeed.

Gifts can support fellowships, academic programs, student research, upgrades to equipment and other initiatives.

To learn more about supported our department, visit **weare.mines.edu** or reach out to the Mines Foundation.