2024–2025 HILDEBRAND DEPARTMENT ENDOWMENT IMPACT REPORT

Breaking Ground

EXPERTISE + INNOVATION + COLLABORATION

The University of Texas at Austin
Hildebrand Department of Petroleum and Geosystems Engineering
Cockrell School of Engineering

Head of the Class

As I begin my third year as department chair, I'm extremely proud that we continue to rank as the best petroleum engineering program in the world and as the Cockrell School's highest-ranked engineering program. But equally important to me are the successes that rankings can't convey: groundbreaking energy research in oil and gas, geothermal, methane emissions, and more; international recognition of our faculty from the Society of Petroleum Engineers, European Association of Geoscientists and Engineers, and others; outstanding teaching recognition from the Cockrell School and beyond; unparalleled learning experiences like our annual Energy AI Hackathon; and the largest first-year undergraduate petroleum engineering class in recent memory.

As you'll see in this report, these are just a few of our recent accomplishments. We're immensely grateful for generous support like that from the Hildebrand endowment. Thanks to you, we remain at the forefront of energy research and education as we undertake the critical work of providing reliable, affordable and sustainable energy for the world.

Matt Balhoff

Lois and Richard Folger Leadership Chair

Bank of America Centennial Professorship in Petroleum Engineering

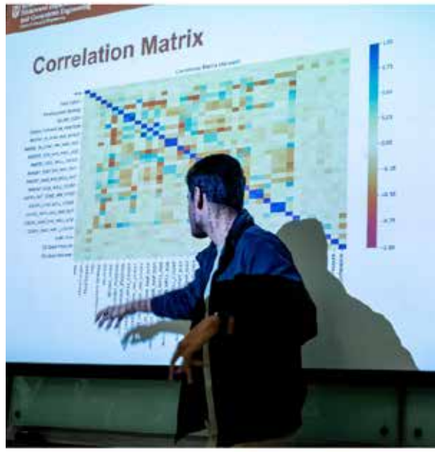
"The hackathon environment is very exciting and high-energy. You can really feel the momentum as everyone is building together and pushing themselves to make progress fast and cross the finish line. Taking part helped me practice planning under pressure, delivering on a tight timeline and pivoting quickly when initial plans do not work. It also strengthened my ability to collaborate, innovate and stay focused on turning ideas into a working solution."

—DEENA ELHOSSARY
(PHD PE 2026)

Energy AI Hackathon

Nearly 200 students competed in the Hildebrand Department's fifth annual Energy AI Hackathon last January, spending 36 hours solving a challenging multivariate energy problem designed by architects Elnara Rustamzade (PhD PE 2025) and Ahmed Merzoug (PhD PE 2026) and curated by completions engineer Amy Rueve (BSPE 2019).

Students used open-source Python and R to code their proposed solutions under the guidance of expert mentors from Chevron, ConocoPhillips, Coterra, Elk Range Royalties, EOG, Equinor, ExxonMobil and Schlumberger. A panel of data science experts from Aramco Americas, ConocoPhillips, Elk Range Royalties, ExxonMobil, Shell, and Subsurface Consultants and Associates judged each team's solution.



“Data science is a crucial part of success in today’s energy industry, and students who have experience analyzing big data sets automatically stand out among their peers. The Energy AI Hackathon is a tremendous opportunity for them to stretch their brains and challenge themselves, all while connecting with people who love doing this for a living every day. It’s a win for students and companies alike — these aspiring engineers and data scientists will one day be leading our industry.”

—AMY RUEVE (BSPE 2019), ENERGY AI HACKATHON MENTOR

>> CONTINUED

Energy AI Hackathon

The Energy AI Hackathon is co-hosted by Professor Michael Pyrcz and Professor John Foster and draws students from across The University of Texas at Austin, including the Cockrell School of Engineering, the College of Natural Sciences, the Jackson School of Geosciences and the McCombs School of Business. At least one Hildebrand Department student and at least one undergraduate student are part of each team.

Through the popular annual event, students broaden their academic experience, gain skills that will set them apart in the workforce, and have the opportunity to collaborate with faculty and industry experts. “As digital technologies continue to transform society and industry, we prioritize educating our students to better prepare them to add value and have great careers,” says Pyrcz. “We in subsurface engineering and geoscience are the original data scientists — it makes sense that we support this effort on the Forty Acres to give Longhorns powerful data science skills.”

"My research understanding CO_2 foam flow in the subsurface supports applications including enhanced oil recovery; carbon capture, utilization and storage; and enhanced geothermal systems. Through my research, I have honed skills in experimental design, data collection and data interpretation. I've also developed strong problem-solving skills and improved my scientific writing and public speaking skills."

—YEVGENIY SAMARKIN
(PHD PE 2027)

Graduate Research Support

By offering either a full semester of assistance or supplemental aid in the form of graduate scholarships and teaching assistantships, the Hildebrand Department is able to more effectively attract and recruit top master's and PhD students. Thanks to this additional funding, graduate students can in turn focus on identifying their areas of research and connecting with faculty and industry sponsors, rather than finding other means of financing their education. This generous financial support for master's and PhD students also helps ensure that the department continues to train exceptional energy engineers who will one day become leaders in both industry and academia.

“I work on modeling the electromagnetic properties of rocks with complex pore structure and mineralogical composition using a combination of experimental data and numerical simulations. Research assistant funding from the Hildebrand endowment has allowed me to dedicate my time and energy fully to this research. It has also enabled me to participate in conferences, network and build meaningful professional connections.”

—MARIELLA EL KHOURY
(PHD PE 2028)

>> CONTINUED

Graduate Research Support

As a result of this funding, Hildebrand Department graduate students have the opportunity to collaborate with faculty members on innovative research that is regularly recognized at the national and international level. Our graduate students present and win awards at conferences and competitions including the Society of Petroleum Engineers ATCE (Annual Technical Conference and Exhibition), the Society of Petrophysicists and Well Log Analysts international student paper contest, the American Geophysical Union annual meeting, and the annual Geothermal Rising Conference. Such a rigorous graduate research program continues to bolster our reputation as a global hub for oil and gas innovation.

Professors of Practice

Professors of Practice bring their professional expertise into Hildebrand Department classrooms, offering real-world industry insights that set students apart during the job search and make them valuable assets to their future companies from day one.

Byron Haynes (BSPE 1982, MSPE 1988, *left*) is Associate Professor of Practice for the department's Facilities Management and Engineering Communication classes. "Throughout my career, I've been deeply invested in mentoring young engineers," he says. "Being in the classroom offers me the unique and wonderful opportunity to pass on my practical expertise through the courses I teach."

Over more than four decades in the energy industry, Haynes led reservoir engineering teams at Shell Global, North Caspian Operating Company, Oxy and BP, and served as an engineering examiner for the Railroad Commission of Texas. Haynes is a Society of Petroleum Engineers (SPE) Distinguished Member, SPE Engineering Professionalism Committee Chair, and winner of the SPE Outstanding Technical Editor Award.

"In Professor Haynes' class I learned just how important it is that engineers understand how to communicate effectively — soft skills vs. hard skills. I learned to think about not only what I will be doing as a petroleum engineer, but also the varied audiences I will need to present my work to. He showed us how diverse the industry is, with many possible avenues to go down, and it got me excited to dig deeper into my major and career plans."

—ROBERT HUA (BSPE 2028)

“As a student researcher, having experienced machinists who are willing to collaborate is extremely valuable. Their expertise saves time, improves the quality of my work, and ensures that complex and potentially hazardous tasks, such as rock coring, are performed safely. Their support allows me to focus on the scientific aspects of my research while knowing that the technical components are handled with care and precision.”

—NADIA MOUEDDEN
(PHD PE 2026)

Machine Shop

In the Hildebrand Department machine shop, machinist Ezekiel Moreno *(right)* takes drawings submitted by students and faculty and brings the plans to life. Whatever an experiment calls for — core samples, holders and plugs; accumulators; heating blocks; flange and window plates; sensor holders; sand tank inlets; and more — Moreno custom builds it from scratch. This year alone, he has created more than 500 parts and written 299 custom software programs.

“It’s exciting to be part of the phenomenal research happening in UT PGE. There is always a new challenge or skill to master,” Moreno says. “By designing and building parts for our students and professors, I hope to get their projects up and running more quickly and, ultimately, help them get closer to solving tough energy problems.”

"Funding from this Hildebrand seed grant enables us to further develop our proposed fine-scale methods so they can be adopted for specific kinds of rock physics modeling and evaluation that is of particular interest to industry. This grant will contribute to fulfilling our objectives in a time interval acceptable to companies who are considering partnering with us and offering additional funding."

—PROFESSOR ZOYA HEIDARI

Hildebrand Seed Grants

Through the Hildebrand Grand Challenge Seed Grant program, UT PGE continues to facilitate robust research in unconventionals, enhanced oil recovery, carbon capture, data analytics, nanoparticle applications and more. Innovators selected for this program receive financial support for high-risk investigations that are often difficult to fund through traditional channels. These grants not only provide crucial assistance to faculty but also encourage a focus on unexplored areas with the potential for significant social impact and follow-on matching funding.

Professor Zoya Heidari *(left)* is a recipient of one of this year's Hildebrand seed grants. Her research with Walker Department of Mechanical Engineering Assistant Professor Tanya Hutter, "Reactions of Kerogen and Clay Minerals in Contact with Water and Carbon Dioxide and Their Impacts on Fluid Distribution and Flow in Organic-Rich Mudrocks," could potentially enhance production and storage decisions in these rocks; more reliably quantify adsorption and swelling in rock components; and enable enhanced rock physics modeling and fluid-flow characterization in the reservoir-scale domain.

"The Energy Science and Technology Institute challenged my previous beliefs and helped me recognize how limited my understanding of the energy sector had been. Learning directly from environmental and industry experts showed me the complexity of energy production and the intentional work being done to balance innovation, sustainability and responsibility. This shift in perspective was one of the most powerful takeaways from the experience."

—DR. SILVIA VALENCIA,
DIRECTOR OF STEM,
CROWLEY ISD

Energy Science and Technology Institute

Middle and high school STEM teachers from across Texas took part last summer in the Hildebrand Department's annual Energy Science and Technology Institute (ESTI) led by Program Manager for Education, Outreach and Training Sabrina Ewald and Associate Professor of Instruction Hilary Olson. Over the course of five days, teachers participated in hands-on activities and labs, faculty-led discussions, and peer breakout sessions on energy topics including the global energy marketplace and carbon capture and storage. They also toured Weiss Energy Hall at the Houston Museum of Natural Science and the Ocean Star Offshore Drilling Rig Museum and Education Center in Galveston.

Participants also experienced ESTI's Energy Excursions curriculum, a series of free online courses developed by Hildebrand Department subject matter and educational experts for high school STEM students and teachers. Designed to align with Texas Essential Knowledge and Skills (TEKS) and College Board standards, Energy Excursions makes it easier for high school teachers to include energy topics in their classrooms.

>> CONTINUED

Energy Science and Technology Institute

During the most recent ESTI, participating teachers also took part in a special carbon storage workshop that included high school students on campus for the Cockrell School of Engineering's Consider Every Option (CEO) summer camp. CEO camps offer rising high school sophomores, juniors and seniors who are interested in science, technology, engineering or math the opportunity to explore cross-sections of STEM disciplines and college majors with similar or overlapping career paths.

Olson, Ewald and Professor Zoya Heidari facilitated the workshop, in which teachers and students analyzed well logs to find a subsurface formation to store carbon dioxide for a carbon storage project. After they interpreted the well logs, everyone was able to see the actual rock by viewing the core samples in the department's Rock Core Lab.

"What I enjoyed most about the Energy Science and Technology Institute was the balance between rigorous content and hands-on, real-world applications. The opportunity to learn directly from experts in petroleum engineering and energy systems, while also engaging in labs and discussions that connected science to industry practices, made the experience especially meaningful."

—JOKASTA MALDONADO-MULLET, TEACHER AND DEPARTMENT HEAD, DR. JOY SHAW MIDDLE SCHOOL

Facts AND Figures

NO. 1 PETROLEUM ENGINEERING PROGRAM IN THE WORLD

Quacquarelli Symonds

NO. 1 PETROLEUM ENGINEERING GRADUATE PROGRAM

U.S. News and World Report

434

UNDERGRADUATE STUDENTS ENROLLED

- 4% Black
- 24% Women
- 27% Hispanic

145

GRADUATE STUDENTS ENROLLED

- 21% Women
- 83% International students

FACULTY HIGHLIGHTS

- 2 National Science Foundation CAREER winners
- 5 National Academy of Engineering members
- 16 Society of Petroleum Engineers distinguished members

RESEARCH HIGHLIGHTS

- $10+ million in research funding annually
- 9 industrial affiliate programs (IAPs) and 6 major research programs
- 270+ published journal and conference papers annually

The University of Texas at Austin
Hildebrand Department of Petroleum and Geosystems Engineering
Cockrell School of Engineering

PGE.UTEXAS.EDU